

# PRELIMINARY TECHNICAL INFORMATION REPORT

for

## SAMMAMISH 18<sup>TH</sup> ASSEMBLAGE

### Preliminary Plat

24403, 24407 & 24515 NE 18<sup>th</sup> Street

King County, Washington



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**DRS Project No. 18009**  
**King County File No. PLAT18-0009**

*Owner/Applicant*

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*Report Prepared by*



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**Report Issue Date**  
**September 24, 2018**

# PRELIMINARY TECHNICAL INFORMATION REPORT

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# **SECTION I**

## **PROJECT OVERVIEW**

The Project is the subdivision of three existing parcels into 32 single-family residential lots per the King County (County) subdivision process. Each parcel is zoned R4 and sums up to a total site area of 5.41 acres. The Tax Parcel Numbers are 2625069033, 2625069048, and 2625069090. The Project location is 24403, 24407, and 24515 NE 18<sup>th</sup> Street, Sammamish; King County, Washington. The Project will meet the drainage requirements of the 2016 King County Surface Water Design Manual (Manual).

## **PREDEVELOPED SITE CONDITIONS**

Total existing Site area is approximately 235,559 s.f. (5.41 ac). The total project development area is 217,332 s.f. (4.989 ac) which excludes the undisturbed areas. The Site contains three single family residences, associated driveways and outbuildings, and landscaping. The Site sits atop a ridge and slopes to the northwest and northeast. A depression exists at the northwest corner of parcel 2625069033 where runoff appears to infiltrate fully. The remainder of the site is moderately sloping westerly and easterly and is surrounded by 244<sup>th</sup> Avenue NE and NE 18<sup>th</sup> Street on the west and north, respectively.

Topography indicates that the Site is contained within two distinct Threshold Discharge Areas, TDA West, and TDA East. Both TDAs appear to be similar in land use/cover with developed areas of landscaping and home sites along with portions of forested and treed areas.

For the purpose of hydrologic calculations, the entire Site is modeled as till forest.

## **DEVELOPED SITE CONDITIONS**

The applicant is seeking approval to subdivide 5.41 acres into 32 single-family residential lots with sizes ranging from approximately 3,400 s.f. to 7,223 s.f. All existing improvements located on the Site will be demolished or removed during plat construction. Impervious surfaces include the 32 residences and their driveways, the proposed roadways and recreation space areas. The remainder of the Site will be landscaped and/or left undisturbed for purposes of tree retention.

The Project is located in a Conservation Flow Control area and is required to provide Level 2 Flow Control and Basic Water Quality treatment, per the 2016 KCSWDM (Manual). All surface water runoff from impervious surfaces will be collected and conveyed to an infiltration vault in Tract A. The vault will be preceded by a stormfilter system with associated presettling vault in order to meet Basic Water Quality requirements prior to infiltration.

## **NATURAL DRAINAGE SYSTEM FUNCTIONS**

The Site consists of two Threshold Discharge Areas (TDA). Runoff from TDA West appears to converge at a low point at the northwest corner of the Site. Field investigation would indicate that this runoff infiltrates and never leaves the Site; field in-situ testing would appear to confirm this observation. Runoff from TDA East sheet flows

across the eastern property line across neighboring properties before reaching an unnamed creek and heading northwest back towards 244<sup>th</sup>.

A review of the SCS soils map for the area (see Figure 4, Soils) indicates Alderwood gravelly sandy loam with 8 to 15 percent slopes (AgC) and Everett very gravelly sandy loam with 8 to 15 percent slopes (EvC). Per the Manual, this soil type is classified as “Till” and “Outwash” material. The SCS Soil series descriptions follow Figure 4.

In evaluating the upstream area, we reviewed the King County iMap, a field topographic survey, and area topography from King County iMap. The Site is bordered to the north and west by public right-of-way with existing conveyance systems. Due to topography, the rest of the property is not subject to upstream tributary area and runoff is conveyed away from the Site. In conclusion, all upstream runoff of the Site and can be considered negligible for the scope of this project due to no foreseen negative impacts being anticipated from the upstream areas.

## FIGURE 1 TIR WORKSHEET

### King County Department of Development and Environmental Services TECHNICAL INFORMATION REPORT (TIR) WORKSHEET

<b>Part 1 PROJECT OWNER AND PROJECT ENGINEER</b> Project Owner: <b>Toll Bros, Inc.</b> Phone: <b>(206) 419-1621</b> Address: <b>8815 122<sup>nd</sup> Ave NE, Suite 200</b> <b>Kirkland, Washington 98033</b>  Project Engineer: <b>Maher A. Joudi, P.E.</b> Company: <b>D. R. STRONG Consulting Engineers Inc.</b>  Phone: <b>(425) 827-3063</b>	<b>Part 2 PROJECT LOCATION AND DESCRIPTION</b> Project Name: <b>Sammamish 18<sup>th</sup> Assemblage</b> Permit#: <b>PLAT18-0009</b> Location: Township: <b>25 North</b> Range: <b>06 East</b> Section: <b>26</b>  Site Address: <b>24403, 24407 &amp; 24515 NE 18<sup>th</sup> Street, Sammamish, WA 98074</b>
<b>Part 3 TYPE OF PERMIT APPLICATION</b> <input checked="" type="checkbox"/> <b>Landuse</b> (e.g., <b>Subdivision</b> / Short Subd. / UPD) <input type="checkbox"/> Building (e.g., M/F / Commercial / SFR) <input type="checkbox"/> Clearing and Grading <input type="checkbox"/> Right-of-Way Use <input type="checkbox"/> Other:	<b>Part 4 OTHER REVIEWS AND PERMITS</b> <div style="display: flex; justify-content: space-between;"> <div style="width: 45%;"> <input type="checkbox"/> DFW HPA  <input type="checkbox"/> COE 404  <input type="checkbox"/> DOE Dam Safety  <input type="checkbox"/> FEMA Floodplain  <input type="checkbox"/> COE Wetlands  <input type="checkbox"/> Other: _____         </div> <div style="width: 45%;"> <input type="checkbox"/> Shoreline Mngmt.  <input checked="" type="checkbox"/> <b>Structural</b>                            <b>/Rockery/Vault</b>  <input type="checkbox"/> ESA Section 7         </div> </div>
<b>Part 5 PLAN AND REPORT INFORMATION</b>	
<b>Technical Information Report</b> <div style="text-align: right; margin-right: 20px;"> <input checked="" type="checkbox"/> <b>Full</b> </div> Type of Drainage Review (check one): <input type="checkbox"/> Targeted <input type="checkbox"/> Simplified <input type="checkbox"/> Large Project <input type="checkbox"/> Directed Date (include revision dates): <b>September 24, 2018</b> Date of Final: _____	<b>Site Improvement Plan (Engr. Plans)</b> Plan Type (check one): <input checked="" type="checkbox"/> <b>Full</b> <input type="checkbox"/> Modified <input type="checkbox"/> Simplified  Date (include revision dates): _____ Date of Final: _____

Part 6 ADJUSTMENT APPROVALS

Type (circle one): Standard / Experimental / Blanket

Description: (include conditions in TIR Section 2)

**None required or provided.**

Approved Adjustment No. \_\_\_\_\_

Date of Approval: \_\_\_\_\_

Part 7 MONITORING REQUIREMENTS

Monitoring Required: Yes / **No**

Start Date: \_\_\_\_\_

Completion Date \_\_\_\_\_

Describe \_\_\_\_\_

Re: KCSWDM Adjustment No. \_\_\_\_\_

Part 8 SITE COMMUNITY AND DRAINAGE BASIN

Community Plan: East Sammamish

Special District Overlays: None

Drainage Basin: Evans Creek

Stormwater Requirements: **Level 2 w/ Basic WQ treatment**

Part 9 ONSITE AND ADJACENT SENSITIVE AREAS

- |  |   |
|--|---|
| <input type="checkbox"/> River/ Stream _____     | <input type="checkbox"/> Steep Slope _____        |
| <input type="checkbox"/> Lake _____              | <input type="checkbox"/> Erosion Hazard _____     |
| <input type="checkbox"/> Wetlands _____          | <input type="checkbox"/> Landslide Hazard _____   |
| <input type="checkbox"/> Closed Depression _____ | <input type="checkbox"/> Coal Mine Hazard _____   |
| <input type="checkbox"/> Floodplain _____        | <input type="checkbox"/> Seismic Hazard _____     |
| <input type="checkbox"/> Other _____             | <input type="checkbox"/> Habitat Protection _____ |
| _____  | <input type="checkbox"/> _____                    |

## Part 10 SOILS

Soil Type EvC	Slopes 8-15%	Erosion Potential Slight-Moderate
AgC	8-15%	Slight-Moderate

☐ High Groundwater Table (within 5 feet)    ☐ Sole Source Aquifer  
☐ Other \_\_\_\_\_    ☐ Seeps/Springs  
☐ Additional Sheets Attached

## Part 11 DRAINAGE DESIGN LIMITATIONS

<b>REFERENCE</b> <input checked="" type="checkbox"/> <b>Core Requirement #2 – Offsite Analysis</b> <input type="checkbox"/> Sensitive/ Critical Areas <input checked="" type="checkbox"/> <b>SEPA</b> <input type="checkbox"/> LID Infeasibility <input type="checkbox"/> Other <input type="checkbox"/> _____ <input type="checkbox"/> Additional Sheet Attached	<b>LIMITATION / SITE CONSTRAINT</b> <b>None</b>    
--	--

## Part 12 TIR SUMMARY SHEET (Provide one TIR Summary Sheet per Threshold Discharge Area)

**Threshold Discharge Area:** The Site is comprised of TDA West and TDA East.  
(name or description)

### Core Requirements (all 9 apply):

Discharge at Natural Location	Number of Natural Discharge Locations: <b>2</b>
Offsite Analysis	Level: <u>1</u> / 2 / 3    dated: <b>March 7, 2018</b>
Flow Control (include facility summary sheet)	Level: 1 / <b>2</b> / 3    or Exemption Number _____ Flow Control BMPS: <b>TBD</b>
Conveyance System	Spill containment located at: <u>TBD</u>
Erosion and Sediment Control/ Construction Stormwater Pollution Prevention	CSWPP/CESCL/ESC Site Supervisor: <b>TBD</b> Contact Phone: <b>TBD</b> After Hours Phone: <b>TBD</b>
Maintenance and Operation	Responsibility (circle one): Private / <b>Public</b> If Private, Maintenance Log Required: Yes / No
Financial Guarantees and Liability	Provided: <b>Yes</b> / No
Water Quality (include facility summary sheet)	Type: <b>Basic</b> / Sens Lake / Enhanced Basic / Bog or exemption No. _____ Landscape Management Plan: Yes / <b>No</b>



Special Requirements (as applicable)	
Area Specific Drainage Requirements	Type: CDA / SDO / MDP / BP / LMP / Shared Fac./ <b>None</b> Name: _____
Floodplain/Floodway Delineation	Type: (circle one): Major / Minor / Exemption <b>(None)</b> 100-year Base Flood Elevation (or range): _____ Datum: _____
Flood Protection Facilities	Describe: <b>None required or provided</b>
Source Control (comm. / industrial land use)	Describe Land use: <b>Residential</b> Describe any structural controls: <b>None required or provided</b>
Oil Control	High-use Site: Yes / <b>No</b> Treatment BMP: _____ Maintenance Agreement: Yes / <b>No</b> with whom? _____
<b>Other Drainage Structures</b>	
Describe: <b>Runoff generated by impervious surfaces will be collected and conveyed to detention facilities.</b>	
<b>Part 13 EROSION AND SEDIMENT CONTROL REQUIREMENTS</b>	
<p>MINIMUM ESC REQUIREMENTS DURING CONSTRUCTION</p> <p><input checked="" type="checkbox"/> <b>Clearing Limits</b></p> <p><input checked="" type="checkbox"/> <b>Cover Measures</b></p> <p><input checked="" type="checkbox"/> <b>Perimeter Protection</b></p> <p><input checked="" type="checkbox"/> <b>Traffic Area Stabilization</b></p> <p><input checked="" type="checkbox"/> <b>Sediment Retention</b></p> <p><input checked="" type="checkbox"/> <b>Surface Water Collection</b></p> <p><input type="checkbox"/> Dewatering Control</p> <p><input checked="" type="checkbox"/> <b>Dust control</b></p> <p><input checked="" type="checkbox"/> <b>Flow Control</b></p> <p><input checked="" type="checkbox"/> <b>Protection of Flow Control BMP Facilities (existing and proposed)</b></p> <p><input checked="" type="checkbox"/> <b>Maintain BMPs / Manage Project</b></p>	<p>MINIMUM ESC REQUIREMENTS AFTER CONSTRUCTION</p> <p><input checked="" type="checkbox"/> <b>Stabilize Exposed Surfaces</b></p> <p><input checked="" type="checkbox"/> <b>Remove and Restore Temporary ESC Facilities</b></p> <p><input checked="" type="checkbox"/> <b>Clean and Remove All Silt and Debris, ensure operation of Permanent Facilities, restore operation of Flow Control BMP Facilities as necessary</b></p> <p><input type="checkbox"/> Flag Limits of SAO and open space Preservation areas</p> <p><input type="checkbox"/> Other _____</p>

**Part 14 STORMWATER FACILITY DESCRIPTIONS (Note: Include Facility Summary and Sketch)**

Flow Control	Type/Description	Water Quality	Type/Description
<input type="checkbox"/> Detention		<input type="checkbox"/> Biofiltration	
<input checked="" type="checkbox"/> Infiltration	<u><b>Vault</b></u>	<input checked="" type="checkbox"/> Wetpool	<u><b>Wetvault</b></u>
<input type="checkbox"/> Regional Facility		<input checked="" type="checkbox"/> Media Filtration	<u><b>Stormfilter</b></u>
<input type="checkbox"/> Shared Facility		<input type="checkbox"/> Oil Control	
<input type="checkbox"/> Flow Control BMPs		<input type="checkbox"/> Spill Control	
<input type="checkbox"/> Other		<input type="checkbox"/> Flow Control BMPs	
		<input type="checkbox"/> Other	

**Part 15 EASEMENTS/TRACTS**

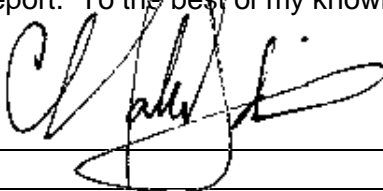
- ☐ Drainage Easement  
☐ Covenant  
☐ Native Growth Protection Covenant  
☒ **Tract**  
☐ Other:

**Part 16 STRUCTURAL ANALYSIS**

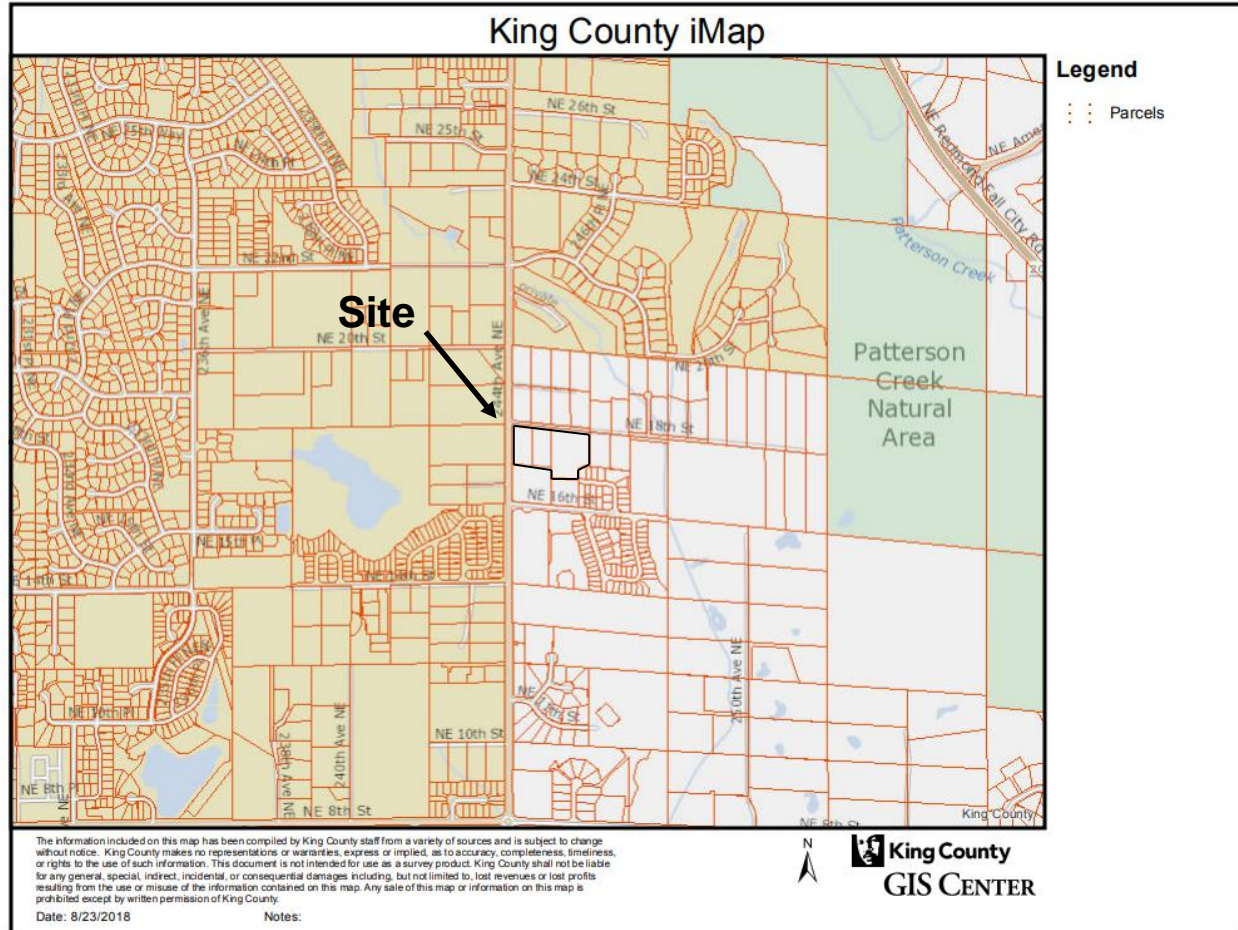
- ☒ **Cast in Place Vault**  
☐ Retaining Wall  
☒ **Rockery > 4' High**  
☐ Structural on Steep Slope  
☐ Other:

**Part 17 SIGNATURE OF PROFESSIONAL ENGINEER**

I, or a civil engineer under my supervision, have visited the site. Actual site conditions as observed were incorporated into this worksheet and the attached Technical Information Report. To the best of my knowledge the information provided here is accurate.

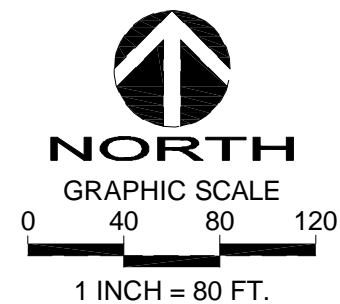
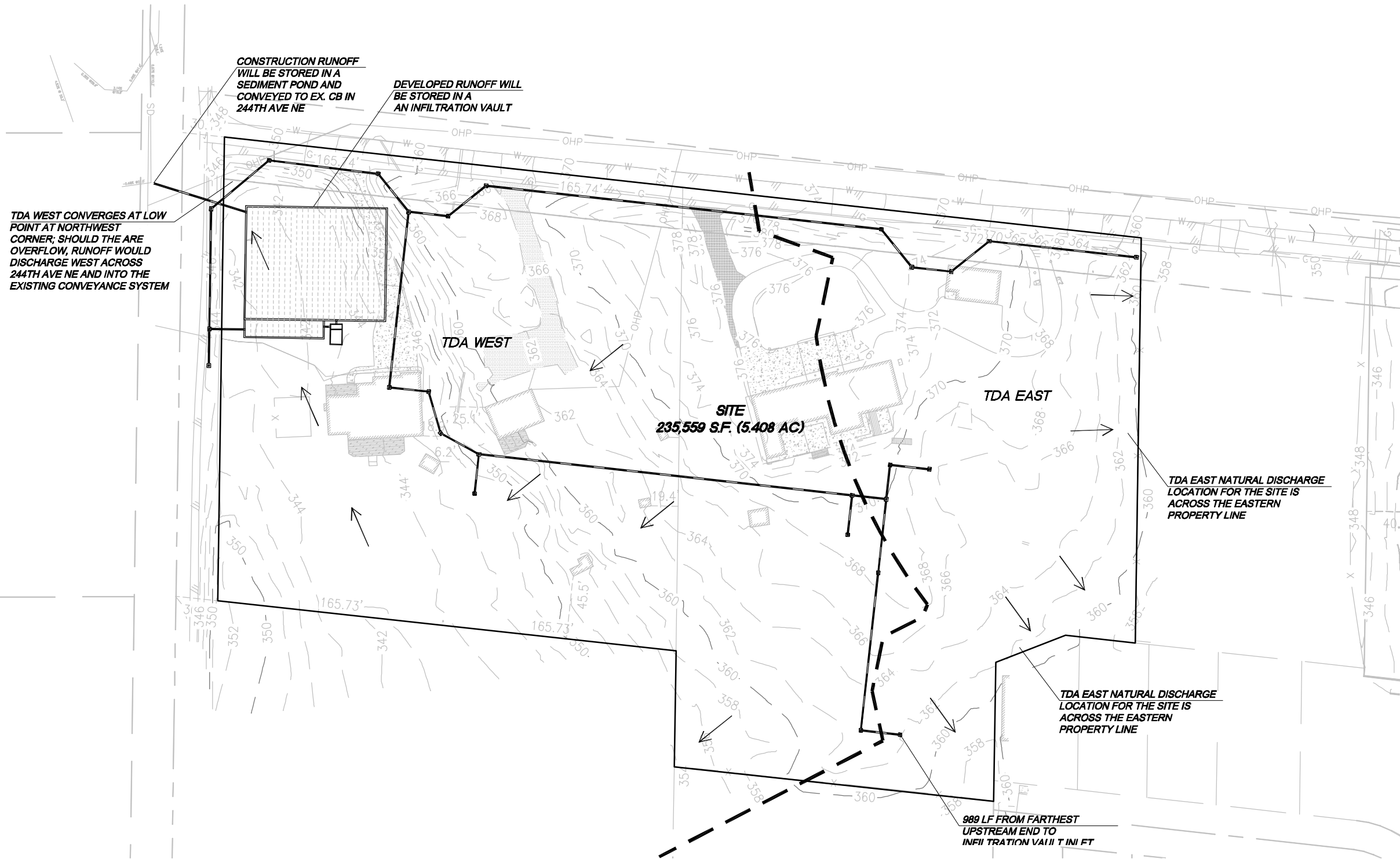

 Sept 24, 2018  
 Signed/Date

**FIGURE 2  
VICINITY MAP**



The information included on this map has been compiled by King County staff from a variety of sources and is subject to change without notice. King County makes no representations or warranties, express or implied, as to accuracy, completeness, timeliness, or rights to the use of such information. King County shall not be liable for any general, special, indirect, incidental, or consequential damages including, but not limited to, lost revenues or lost profits resulting from the use or misuse of the information contained on this map. Any sale of this map or information on this map is prohibited except by written permission of King County.

**FIGURE 3**  
**DRAINAGE BASINS, SUBBASINS, AND SITE CHARACTERISTICS MAP**



**FIGURE 3: DRAINAGE BASINS & SUBBASINS**  
**SAMMAMISH 18TH ASSEMBLAGE**  
**24403, 24407, 24515 NE 18TH STREET**  
**SAMMAMISH, WA**

**FIGURE 4  
SOILS**



## King County Area, Washington

### AgC—Alderwood gravelly sandy loam, 8 to 15 percent slopes

#### Map Unit Setting

- *National map unit symbol:* 2t626
- *Elevation:* 50 to 800 feet
- *Mean annual precipitation:* 20 to 60 inches
- *Mean annual air temperature:* 46 to 52 degrees F
- *Frost-free period:* 160 to 240 days
- *Farmland classification:* Prime farmland if irrigated

#### Map Unit Composition

- *Alderwood and similar soils:* 85 percent
- *Minor components:* 15 percent
- *Estimates are based on observations, descriptions, and transects of the map unit.*

#### Description of Alderwood Setting

- *Landform:* Ridges, hills
- *Landform position (two-dimensional):* Shoulder
- *Landform position (three-dimensional):* Nose slope, talf
- *Down-slope shape:* Linear, convex
- *Across-slope shape:* Convex
- *Parent material:* Glacial drift and/or glacial outwash over dense glaciomarine deposits

#### Typical profile

- *A - 0 to 7 inches:* gravelly sandy loam
- *Bw1 - 7 to 21 inches:* very gravelly sandy loam
- *Bw2 - 21 to 30 inches:* very gravelly sandy loam
- *Bg - 30 to 35 inches:* very gravelly sandy loam
- *2Cd1 - 35 to 43 inches:* very gravelly sandy loam
- *2Cd2 - 43 to 59 inches:* very gravelly sandy loam

#### Properties and qualities

- *Slope:* 8 to 15 percent
- *Depth to restrictive feature:* 20 to 39 inches to densic material
- *Natural drainage class:* Moderately well drained
- *Capacity of the most limiting layer to transmit water (Ksat):* Very low to moderately low (0.00 to 0.06 in/hr)
- *Depth to water table:* About 18 to 37 inches
- *Frequency of flooding:* None
- *Frequency of ponding:* None
- *Available water storage in profile:* Very low (about 2.7 inches)

#### Interpretive groups

- *Land capability classification (irrigated):* None specified
- *Land capability classification (nonirrigated):* 4s
- *Hydrologic Soil Group:* B
- *Other vegetative classification:* Limited Depth Soils (G002XN302WA), Limited Depth Soils (G002XS301WA), Limited Depth Soils (G002XF303WA)



## Minor Components

### Everett

- *Percent of map unit:* 5 percent
- *Landform:* Eskers, kames, moraines
- *Landform position (two-dimensional):* Shoulder, footslope
- *Landform position (three-dimensional):* Crest, base slope
- *Down-slope shape:* Convex
- *Across-slope shape:* Convex

### Indianola

- *Percent of map unit:* 5 percent
- *Landform:* Eskers, kames, terraces
- *Landform position (three-dimensional):* Tread
- *Down-slope shape:* Linear
- *Across-slope shape:* Linear

### Shalcar

- *Percent of map unit:* 3 percent
- *Landform:* Depressions
- *Landform position (three-dimensional):* Dip
- *Down-slope shape:* Concave
- *Across-slope shape:* Concave

### Norma

- *Percent of map unit:* 2 percent
- *Landform:* Depressions, drainageways
- *Landform position (three-dimensional):* Dip
- *Down-slope shape:* Concave, linear
- *Across-slope shape:* Concave

## EvC—Everett very gravelly sandy loam, 8 to 15 percent slopes

### Map Unit Setting

- *National map unit symbol:* 2t62b
- *Elevation:* 30 to 900 feet
- *Mean annual precipitation:* 35 to 91 inches
- *Mean annual air temperature:* 48 to 52 degrees F
- *Frost-free period:* 180 to 240 days
- *Farmland classification:* Farmland of statewide importance

### Map Unit Composition

- *Everett and similar soils:* 80 percent
- *Minor components:* 20 percent
- *Estimates are based on observations, descriptions, and transects of the mapunit.*

## Description of Everett

### Setting

- *Landform:* Kames, eskers, moraines
- *Landform position (two-dimensional):* Shoulder, footslope
- *Landform position (three-dimensional):* Crest, base slope
- *Down-slope shape:* Convex
- *Across-slope shape:* Convex
- *Parent material:* Sandy and gravelly glacial outwash



**Typical profile**

- *Oi* - 0 to 1 inches: slightly decomposed plant material
- *A* - 1 to 3 inches: very gravelly sandy loam
- *Bw* - 3 to 24 inches: very gravelly sandy loam
- *C1* - 24 to 35 inches: very gravelly loamy sand
- *C2* - 35 to 60 inches: extremely cobbly coarse sand

**Properties and qualities**

- *Slope*: 8 to 15 percent
- *Depth to restrictive feature*: More than 80 inches
- *Natural drainage class*: Somewhat excessively drained
- *Capacity of the most limiting layer to transmit water (Ksat)*: High (1.98 to 5.95 in/hr)
- *Depth to water table*: More than 80 inches
- *Frequency of flooding*: None
- *Frequency of ponding*: None
- *Available water storage in profile*: Low (about 3.2 inches)

**Interpretive groups**

- *Land capability classification (irrigated)*: None specified
- *Land capability classification (nonirrigated)*: 4s
- *Hydrologic Soil Group*: A
- *Forage suitability group*: Droughty Soils (G002XN402WA), Droughty Soils (G002XS401WA), Droughty Soils (G002XF403WA)
- *Hydric soil rating*: No

**Minor Components****Alderwood**

- *Percent of map unit*: 10 percent
- *Landform*: Hills, ridges
- *Landform position (two-dimensional)*: Shoulder
- *Landform position (three-dimensional)*: Nose slope, talus
- *Down-slope shape*: Convex, linear
- *Across-slope shape*: Convex
- *Hydric soil rating*: No

**Indianola**

- *Percent of map unit*: 10 percent
- *Landform*: Eskers, kames, terraces
- *Landform position (three-dimensional)*: Riser
- *Down-slope shape*: Linear
- *Across-slope shape*: Linear
- *Hydric soil rating*: No

## SECTION II

### CONDITIONS AND REQUIREMENTS SUMMARY

The Project must comply with the following Core and Special Requirements:

- **C.R. #1 – Discharge at the Natural Location:** All Site runoff will infiltrate; no discharge is anticipated.
- **C.R. #2 – Offsite Analysis:** An offsite analysis is included in Section III. The Analysis describes the Site's runoff pattern in detail.
- **C.R. #3 – Flow Control:** The Project is located in a Conservation Flow Control Area. A detention pond will provide flow control as required. The Project is required to match durations for 50% of the two-year peak flow up to the full 50-year peak flow. Also match developed peak discharge rates to predeveloped peak discharge rates for the 2-year and 10-year return periods (KCSWDM, Sec. 1.2.)
- **C.R. #4 – Conveyance System:** New pipe systems and ditches/channels are required to be designed with sufficient capacity to convey and contain (at minimum) the 25-year peak flow, assuming developed conditions for onsite tributary areas and existing conditions for any offsite tributary areas. Pipe system structures and ditches/channels may overtop for runoff events that exceed the 25-year design capacity, provided the overflow from a 100-year runoff event does not create or aggravate a "severe flooding problem" or "severe erosion problem" as defined in C.R. #2. Any overflow occurring onsite for runoff events up to and including the 100-year event must discharge at the natural location for the project Site. In residential subdivisions, such overflow must be contained within an onsite drainage easement, tract, covenant or public right-of-way. The proposed conveyance system was analyzed using the KCBW program, and is capable of conveying the 100-year peak storm without overtopping any structures or channels. This analysis will be performed at time of construction plan preparation.
- **C.R. #5 – Erosion and Sediment Control:** The Project provides the nine minimum ESC measures.
- **C.R. #6 – Maintenance and Operations:** Maintenance of the proposed storm drainage facilities will be the responsibility of the County. An Operation and Maintenance Manual will be included in Section X at the time of construction plan preparation.
- **C.R. #7 – Financial Guarantees and Liability:** Prior to commencing construction, the Applicant must post a drainage facilities restoration and Site stabilization financial guarantee. For any constructed or modified drainage facilities to be maintained and operated by the City, the Applicant must: 1) Post a drainage defect and maintenance financial guarantee for a period of two years, and 2) Maintain the drainage facilities during the two-year period following posting of the drainage defect and maintenance financial guarantee.

- **C.R. #8 – Water Quality:** The Project is located in the Basic Water Quality Treatment area. A Stormfilter preceded by a presettling vault, upstream of the infiltration facility, will accommodate this requirement.
- **C.R. #9 – Flow Control BMP's:** Any impervious surface served by an infiltration facility designed in accordance with the flow control facility requirement (Section 1.2.3.1), the facility implementation requirements (Section 1.2.3.2), and the design criteria for infiltration facilities (Section 5.2) is exempt from the flow control BMPs requirement. (Manual, Section 1.2.9.1(A))
- **S.R. #1 – Other Adopted Area-Specific Requirements:** Not applicable for this Project.
- **S.R. #2 – Floodplain/Floodway Delineation:** The Project parcel is not within a 100-year floodplain defined by any of FEMA's floodplain insurance rate maps. No other specific data exists establishing the base (100-year) flood elevation through the Site.
- **S.R. #3 – Flood Protection Facilities:** Not applicable for this Project.
- **S.R. #4 – Source Control:** Not applicable for this Project.
- **S.R. #5 – Oil Control:** Not applicable for this Project.

## SECTION III

### OFF-SITE ANALYSIS

An offsite Level One Downstream Analysis was prepared by D.R. STRONG Consulting Engineers Inc. and is included in this Section.

#### TASK 1: DEFINE AND MAP THE STUDY AREA

This Offsite Analysis was prepared in accordance with Core Requirement #2, Section 1.2.2 of the 2016 King County Surface Water Design Manual (Manual). The Site is located at 24403, 24407 and 24515 NE 18th Street; King County, WA.

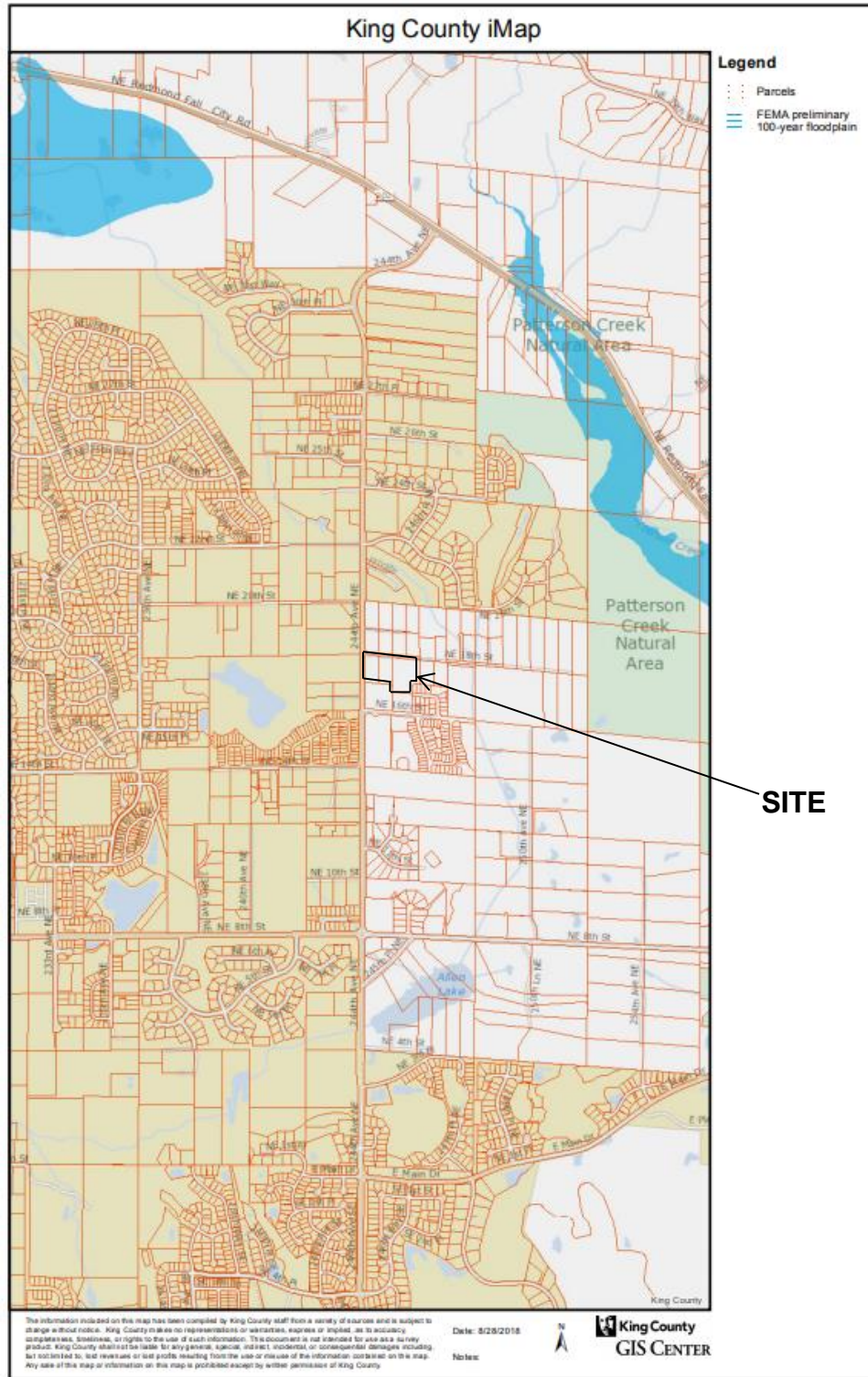
See Figures 2 through 11 for maps of the study area.

#### TASK 2: RESOURCE REVIEW

- Adopted Basin Plans: *None at this time.*
- Floodplain/Floodway (FEMA) Map: *No floodplains exist on site, See Figure 10.*
- Other Offsite Analysis Reports: *Kensington Enclave, Mystic Lake*
- Sensitive Areas Folio Maps: *See Figures 4-8 for documentation of the distance downstream from the proposed project to the nearest critical areas. Included, are sections of the King County Sensitive Areas Folio which indicate the following:*
  - **Figure 5 Streams and 100-Year Floodplains and Floodway:** *There are no floodplains onsite. A stream is located within 1 mile of the site along the downstream path.*
  - **Figure 6 Wetlands:** *King County has not identified any wetlands in the immediate vicinity of the project site, however three wetlands are found within one mile downstream of the site.*
  - **Figure 7 Erosion Hazard:** *There are no mapped Erosion Hazard Areas onsite, however there is one Erosion Hazard Area within one mile of the Site along the downstream path.*
  - **Figure 8 Landslide Hazard:** *There is one area mapped as a Landslide Hazard Area within 1 mile of the site along the downstream path.*
  - **Figure 9 Seismic Hazard:** *There are no mapped Seismic Hazard Areas on the project site; however the Evans Creek area is identified as a Seismic Hazard Areas within one mile of the Site along the downstream path.*
- DNRP Drainage Complaints and Studies: *As shown in Figure 11, there are several drainage complaints (10 or more) along the downstream path. All complaints are closed with none within the last 10 years with the exception of complaint number 2012-0043. This complaint was researched and found to be a fee inquiry and not applicable to this analysis. None of the complaints are expected to have an impact on this proposal.*

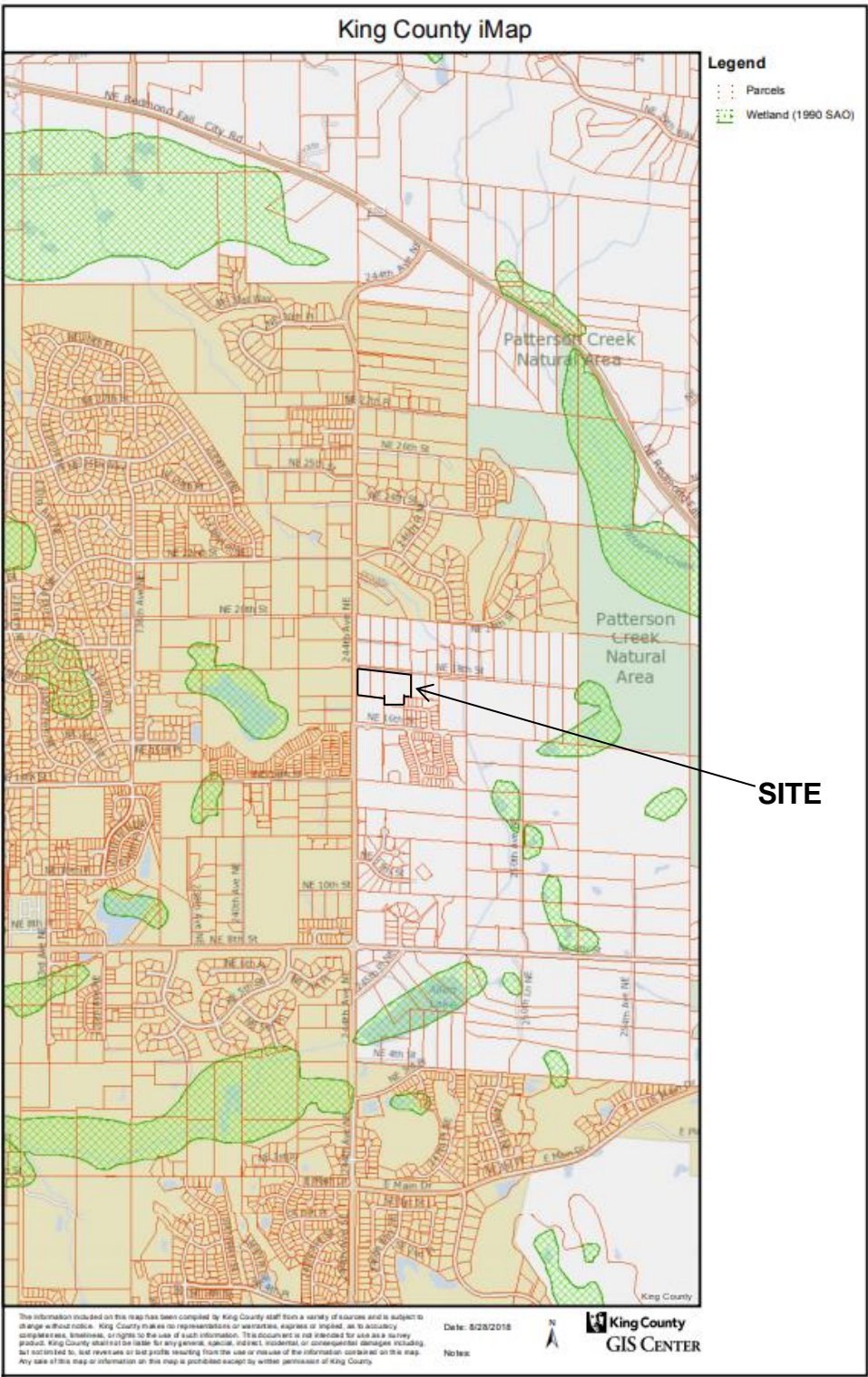
- Road Drainage Problems: *None noted.*
- USDA King County Soils Survey: *See Figure 4.*
- Wetlands Inventory: *Vol. 1 East (1990) – The wetland inventory revealed no additional wetlands within the downstream path.*
- Migrating River Studies: *None are applicable to the site.*
- Washington State Department of Ecology's latest published Clean Water Act Section 303d list of polluted waters: *None listed along the ¼ mile downstream path. Just past ¼ mile, the unnamed tributary to Evans Creek carries a Category 4A – Temperature, listing for water quality,*
- King County Designated Water Quality Problems: *None at this time.*
- Adopted Stormwater Compliance Plans: *None applicable to this site.*
- Basin Reconnaissance Summary Reports: *No reports available for this area.*

**FIGURE 5  
STREAMS AND 100-YEAR FLOODPLAINS AND FLOODWAY**

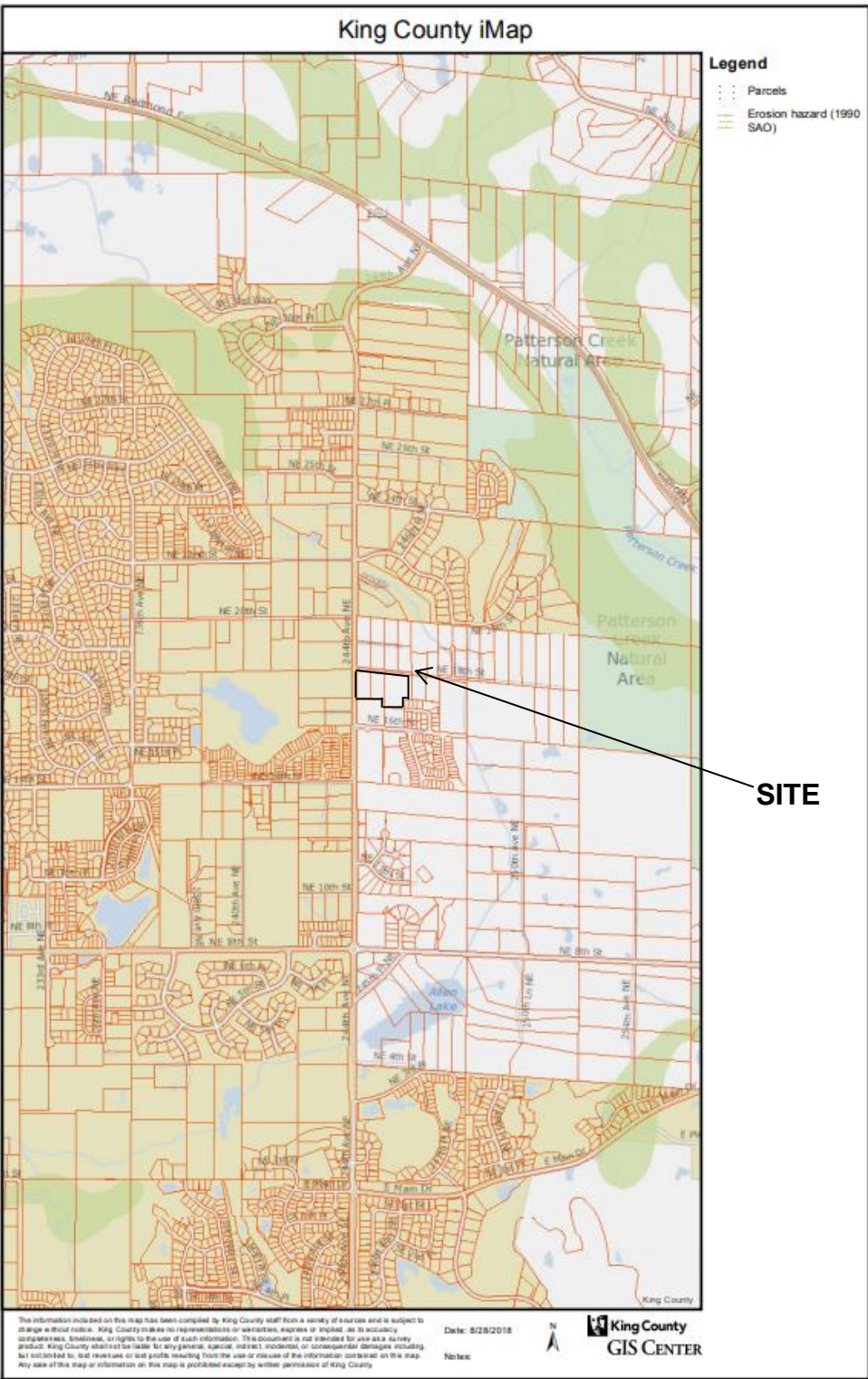




# **FIGURE 6 WETLANDS**

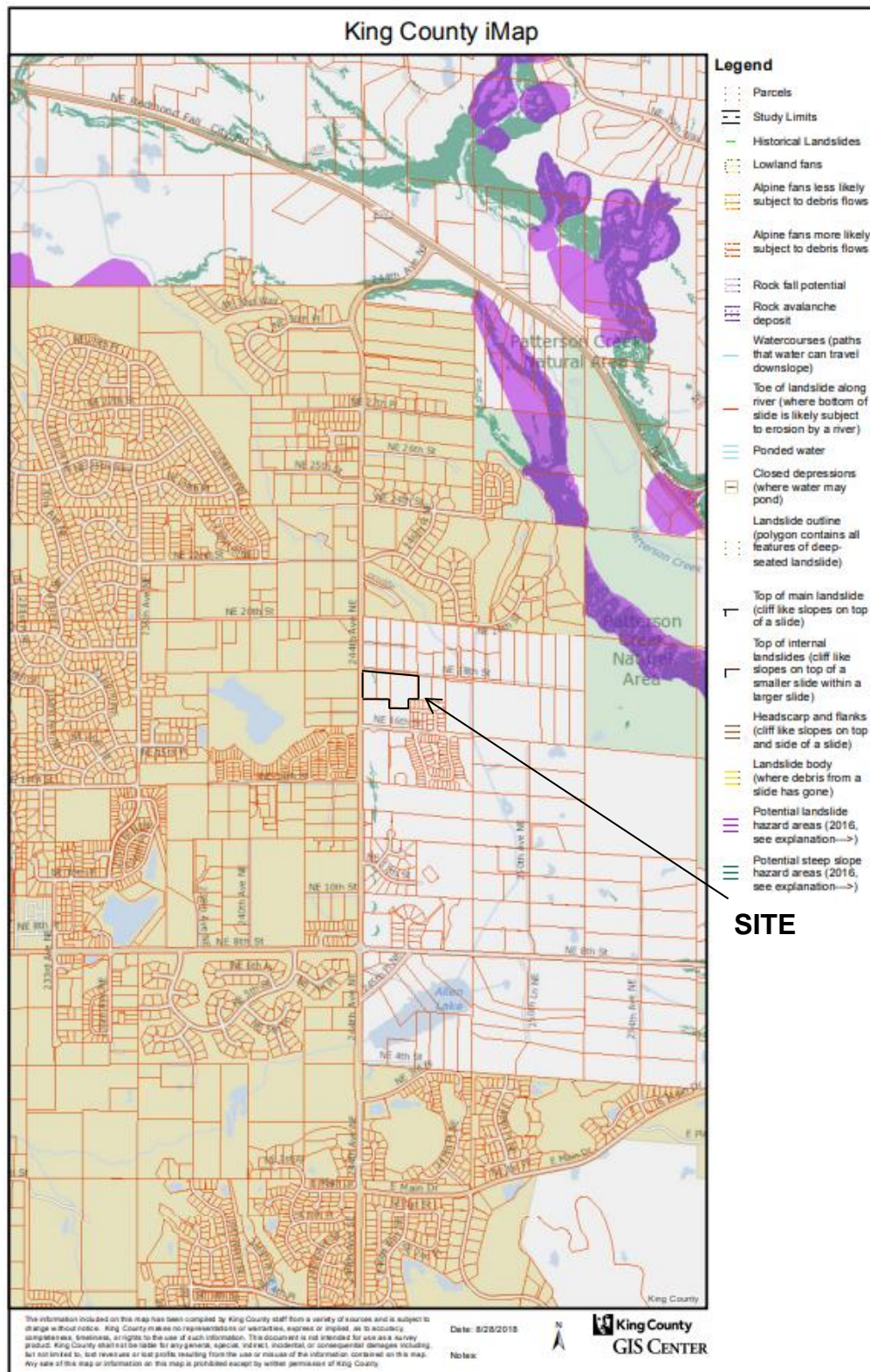


**FIGURE 7  
EROSION HAZARD AREAS**

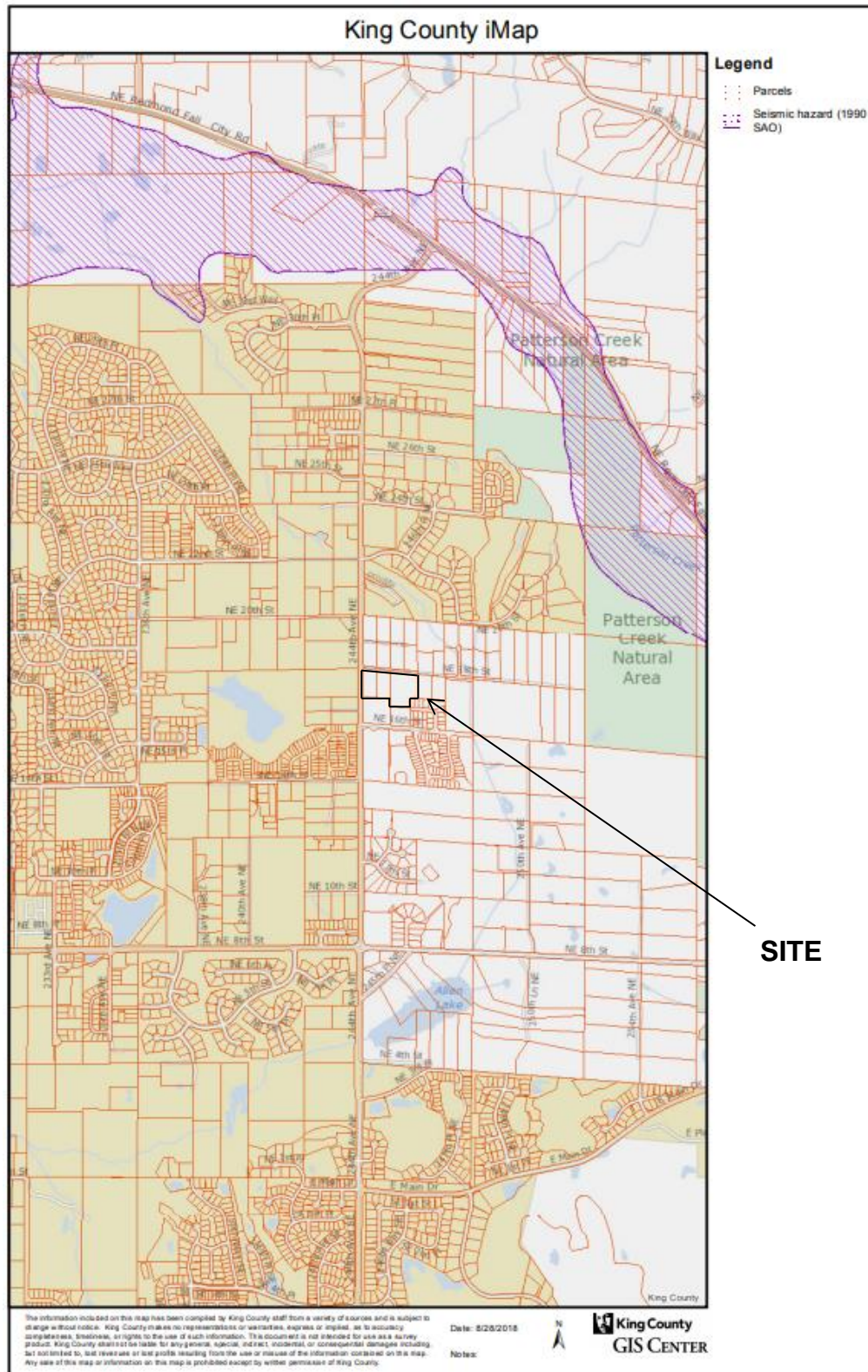




# FIGURE 8 LANDSLIDE HAZARD AREAS



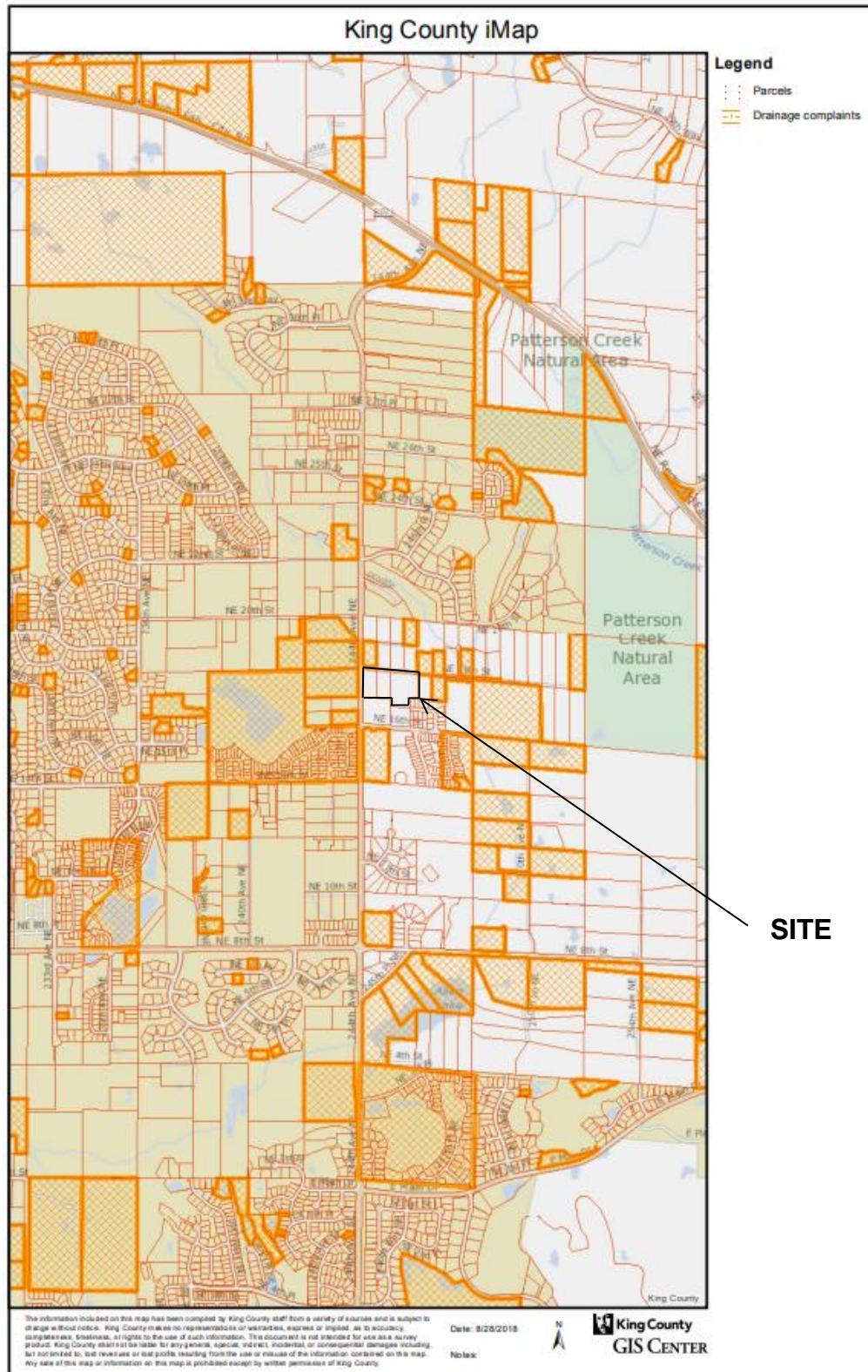
# **FIGURE 9** **SEISMIC HAZARD AREAS**





[illegible]

# FIGURE 11 DRAINAGE COMPLAINTS



### **TASK 3: FIELD INSPECTION**

#### **UPSTREAM TRIBUTARY AREA**

In evaluating the upstream area, we reviewed the King County iMap, a field topographic survey, and area topography from King County iMap. Negligible runoff may enter from 244<sup>th</sup> and 18<sup>th</sup> but will not impact the project given the proposed road and drainage improvements. Otherwise, runoff does not enter the Site from any other direction.

#### **GENERAL ONSITE AND OFFSITE DRAINAGE DESCRIPTION**

Runoff from TDA West appears to converge at low point at the northwest corner with no apparent outlet. Field observation of the vegetation in this area indicates that water does not pond and would therefore appear to infiltrate. This observation was confirmed with in-situ infiltration testing that confirmed that runoff does indeed infiltrate. Should the soil ever saturate and the area overflow, runoff would head west across 244<sup>th</sup> and into the conveyance system conveys runoff around the facility of the Sammamish Operations and Maintenance Building and continues north towards an unnamed tributary to Evans Creek. From this point, the downstream analysis for the Mystic Lake Plat was referred to and verified. That report states that runoff heads north towards a culvert under NE 20<sup>th</sup> Street and continues north in a grass swale through private property. One-quarter mile downstream of the Site is within this reach; the downstream analysis for this TDA was concluded at this point.

Runoff from TDA East sheet flows across neighboring properties to the east before reaching the conveyance system located within the driveway for parcel 262506-9055. This system conveys runoff north and then east in 18<sup>th</sup> before heading north at 247<sup>th</sup> Place NE (±750'). Runoff then enters the same unnamed tributary to Evans Creek as runoff from TDA West approximately 1,700 ft upstream of 244<sup>th</sup> Avenue NE. Runoff continues in a northwesterly direction through this tributary through private properties before eventually reaching 244<sup>th</sup>. The quarter mile point is within this reach; the downstream analysis for this TDA was concluded at this point.

## **TASK 4: DRAINAGE SYSTEM DESCRIPTION AND PROBLEM DESCRIPTIONS**

### **DRAINAGE SYSTEM DESCRIPTION**

The downstream analysis is further illustrated and detailed in Figure 12, the Downstream Map. The drainage area is located within the East Sammamish Drainage Basin. The drainage area was evaluated by reviewing available resources described in Task 2, and by conducting a field reconnaissance; See Task 3 for path details.

### **TASK 5: MITIGATION OF EXISTING OR POTENTIAL PROBLEMS**

A review of the King County Water and Land Resources Division – Drainage Services Section *Documented Drainage Complaints* within one mile of the downstream flow paths revealed one complaint within the last ten years that has since been closed and was with regard to a fee inquiry. There are several older complaints that can be seen in Figure 11.

The project should not create any problems as specified in Section 1.2.2.1 of the Manual and therefore is not required to provide Drainage Problem Impact Mitigation subject to the requirements of Section 1.2.2.2.

The project drains to an unnamed tributary of Evans Creek which has been assessed with a category 4A listing for Temperature (Type 3). However, mitigation is not required due the Project proximity to the assessed water body (greater than ¼ mile). Additionally, the project is proposing full infiltration for all project runoff and not proposing an open pond water quality facility.



**FIGURE 12**  
**OFFSITE ANALYSIS DOWNSTREAM MAP**



## SECTION IV

### FLOW CONTROL AND WATER QUALITY FACILITY ANALYSIS AND DESIGN

#### EXISTING SITE HYDROLOGY (PART A)

WWHM was used to model the peak runoff from the Site. Per Table 3.2.2.b of the Manual the soil type is modeled as “Outwash” for the Everett very gravelly sandy loam SCS classification as shown in Figure 4, Soils. The entire Site is modeled as “Forest.” Results of the WWHM analysis are included in this section. Because the project is proposing full infiltration, the entire Site was modeled as a single basin, despite the two threshold discharge areas and also modeled as Till in the predeveloped condition as it is inconsequential to the design given the infiltration.

Basin 1 Predeveloped

Subbasin Name: Basin 1

Flows To : Surface Interflow Groundwater

Area in Basin ☐ Show Only Selected

Available Pervious		Available Impervious	
	Acres		Acres
<input type="checkbox"/> A/B, Forest, Flat	0	<input type="checkbox"/> ROADS/FLAT	0
<input type="checkbox"/> A/B, Forest, Mod	0	<input checked="" type="checkbox"/> ROADS/MOD	0
<input type="checkbox"/> A/B, Forest, Steep	0	<input type="checkbox"/> ROADS/STEEP	0
<input type="checkbox"/> A/B, Pasture, Flat	0	<input checked="" type="checkbox"/> ROOF TOPS/FLAT	0
<input type="checkbox"/> A/B, Pasture, Mod	0	<input checked="" type="checkbox"/> DRIVEWAYS/FLAT	0
<input type="checkbox"/> A/B, Pasture, Steep	0	<input type="checkbox"/> DRIVEWAYS/MOD	0
<input type="checkbox"/> A/B, Lawn, Flat	0	<input type="checkbox"/> DRIVEWAYS/STEEP	0
<input type="checkbox"/> A/B, Lawn, Mod	0	<input checked="" type="checkbox"/> SIDEWALKS/FLAT	0
<input type="checkbox"/> A/B, Lawn, Steep	0	<input type="checkbox"/> SIDEWALKS/MOD	0
<input type="checkbox"/> C, Forest, Flat	0	<input type="checkbox"/> SIDEWALKS/STEEP	0
<input checked="" type="checkbox"/> C, Forest, Mod	4.989	<input type="checkbox"/> PARKING/FLAT	0
<input type="checkbox"/> C, Forest, Steep	0	<input type="checkbox"/> PARKING/MOD	0
<input type="checkbox"/> C, Pasture, Flat	0	<input type="checkbox"/> PARKING/STEEP	0
<input type="checkbox"/> C, Pasture, Mod	0	<input type="checkbox"/> POND	0
<input type="checkbox"/> C, Pasture, Steep	0	<input checked="" type="checkbox"/> Porous Pavement	0
<input checked="" type="checkbox"/> C, Lawn, Flat	0		
<input checked="" type="checkbox"/> C, Lawn, Mod	0		
<input type="checkbox"/> C, Lawn, Steep	0		
<input type="checkbox"/> SAT, Forest, Flat	0		
<input type="checkbox"/> SAT, Forest, Mod	0		
<input type="checkbox"/> SAT, Forest, Steep	0		

Pervious Total: 4.989 Acres  
 Impervious Total: 0 Acres  
 Basin Total: 4.989 Acres

Deselect Zero Select By: GO

#### Output:

##### Flow Frequency

##### Flow (cfs) Predeveloped

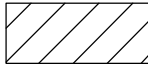


2 Year = 0.1485  
 5 Year = 0.2434  
 10 Year = 0.3044  
 25 Year = 0.3770  
 50 Year = 0.4272  
 100 Year = 0.4742



**FIGURE 13**  
**PREDEVELOPMENT AREA MAP**



LEGEND:

- |   |  |
|---|--|
|  | PROJECT AREA (FORESTED):<br>217,332 S.F. (4.989 ACRES) |
|  | TOTAL SITE AREA: 235,559 S.F. (5.408 AC)               |
|  | TOTAL PROJECT AREA: 217,332 S.F. (4.989 AC)            |

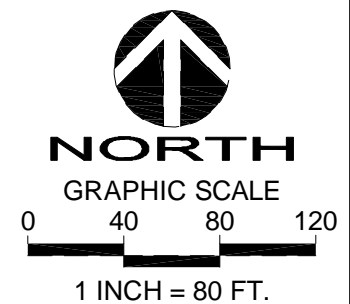
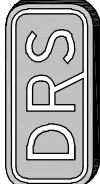


FIGURE 13: PRE-DEVELOPED AREA MAP  
SAMMAMISH 18TH ASSEMBLAGE  
24403, 24407, 24515 NE 18TH STREET  
SAMMAMISH, WA



D.R. STRONG  
CONSULTING ENGINEERS

ENGINEERS PLANNERS SURVEYORS  
620 - 7th AVENUE KIRKLAND, WA 98033  
O 425.827.3063 F 425.827.2423

DRAFTED BY: YLP  
DESIGNED BY: YLP  
PROJECT ENGINEER: MAJ  
DATE: 09.24.18  
PROJECT NO.: 18009

FIGURE: 13

## DEVELOPED SITE AREA HYDROLOGY (PART B)

WWHM was used to model the developed peak runoff from the Site. The soil types are unchanged from the pre-developed conditions. Results of the WWHM analysis are included in this section.

Basin 1 Mitigated

Subbasin Name: Basin 1 ☐ Designate as Bypass for POC

Flows To: Surface ☐ Interflow ☐ Groundwater ☐

Flows To: ☐ Vault 1 ☐ Vault 1 ☐

Area in Basin ☐ Show Only Selected

Available Pervious		Available Impervious	
	Acres		Acres
<input type="checkbox"/> A/B, Forest, Flat	0	<input type="checkbox"/> ROADS/FLAT	0
<input type="checkbox"/> A/B, Forest, Mod	0	<input checked="" type="checkbox"/> ROADS/MOD	1.513
<input type="checkbox"/> A/B, Forest, Steep	0	<input type="checkbox"/> ROADS/STEEP	0
<input type="checkbox"/> A/B, Pasture, Flat	0	<input checked="" type="checkbox"/> ROOF TOPS/FLAT	1.286
<input type="checkbox"/> A/B, Pasture, Mod	0	<input checked="" type="checkbox"/> DRIVEWAYS/FLAT	.294
<input type="checkbox"/> A/B, Pasture, Steep	0	<input type="checkbox"/> DRIVEWAYS/MOD	0
<input type="checkbox"/> A/B, Lawn, Flat	0	<input type="checkbox"/> DRIVEWAYS/STEEP	0
<input type="checkbox"/> A/B, Lawn, Mod	0	<input checked="" type="checkbox"/> SIDEWALKS/FLAT	.35
<input type="checkbox"/> A/B, Lawn, Steep	0	<input type="checkbox"/> SIDEWALKS/MOD	0
<input type="checkbox"/> C, Forest, Flat	0	<input type="checkbox"/> SIDEWALKS/STEEP	0
<input checked="" type="checkbox"/> C, Forest, Mod	0	<input type="checkbox"/> PARKING/FLAT	0
<input type="checkbox"/> C, Forest, Steep	0	<input type="checkbox"/> PARKING/MOD	0
<input type="checkbox"/> C, Pasture, Flat	0	<input type="checkbox"/> PARKING/STEEP	0
<input type="checkbox"/> C, Pasture, Mod	0	<input type="checkbox"/> POND	0
<input type="checkbox"/> C, Pasture, Steep	0	<input type="checkbox"/> Porous Pavement	0
<input checked="" type="checkbox"/> C, Lawn, Flat	.7735		
<input checked="" type="checkbox"/> C, Lawn, Mod	.7735		
<input type="checkbox"/> C, Lawn, Steep	0		
<input type="checkbox"/> SAT, Forest, Flat	0		
<input type="checkbox"/> SAT, Forest, Mod	0		
<input type="checkbox"/> SAT, Forest, Steep	0		

Pervious Total 1.547 Acres

Impervious Total 3.443 Acres

Basin Total 4.99 Acres

Deselect Zero Select By: GO

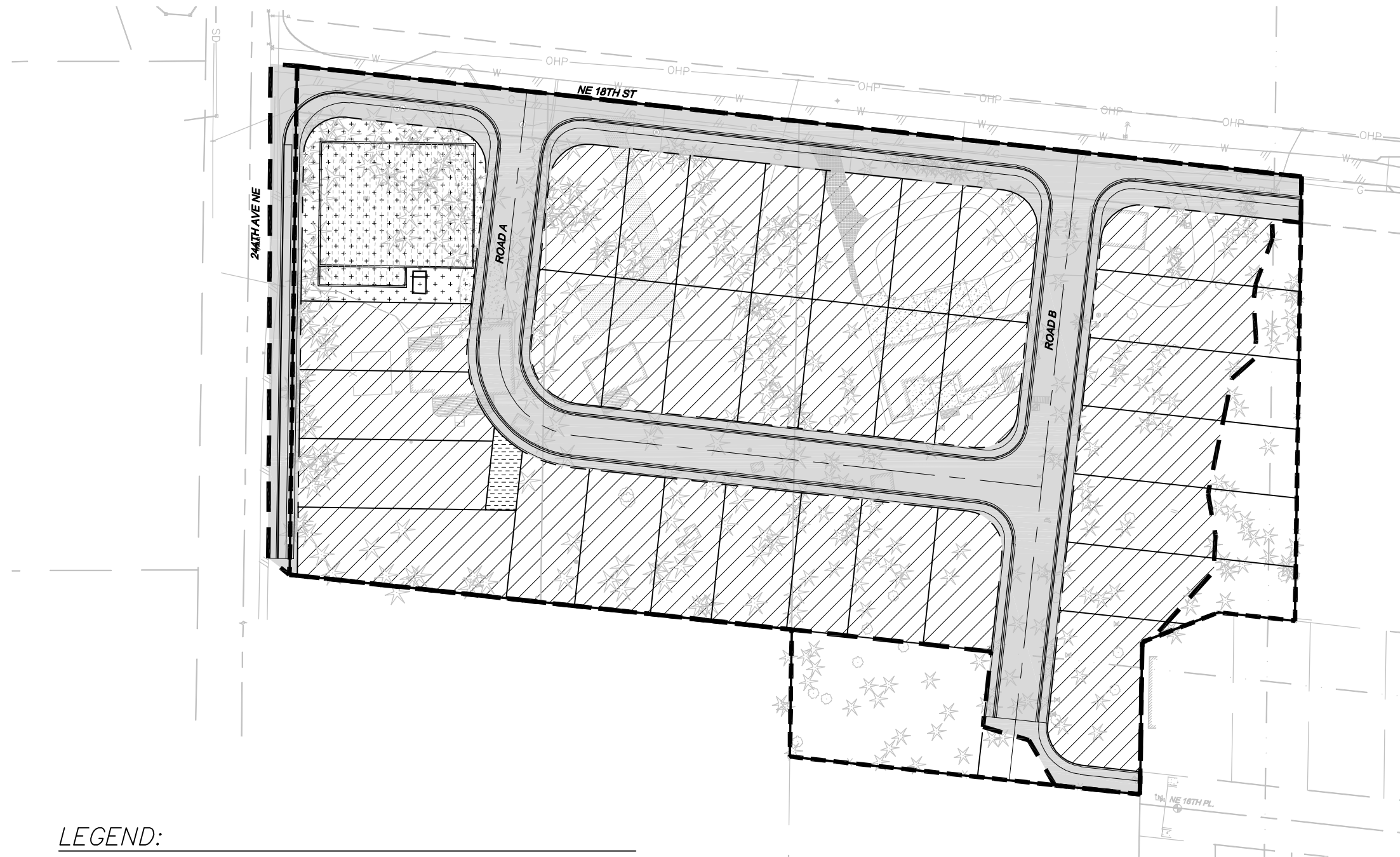
## Output:

### Flow Frequency

Flow (cfs) 0701

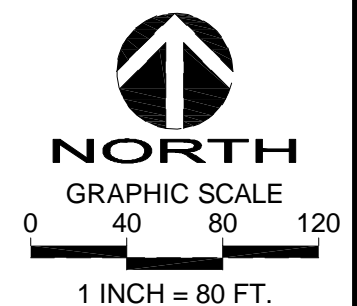
2 Year = 1.4996  
 5 Year = 1.9424  
 10 Year = 2.2555  
 25 Year = 2.6746  
 50 Year = 3.0045  
 100 Year = 3.3499

**FIGURE 14**  
**DEVELOPED AREA MAP**



**LEGEND:**

-----	TOTAL SITE AREA:	235,559 S.F. (5.408 AC)
-----	TOTAL PROJECT AREA:	217,332 S.F. (4.989 AC)
	R.O.W. AREA:	64,995 S.F. (1.492 AC)
	IMPERVIOUS:	64,995 S.F. (1.492 AC)
	LOT AREA:	137,926 S.F. (3.166 AC)
	IMPERVIOUS:	80,000 S.F. (1.836 AC)
	PERVIOUS:	57,926 S.F. (1.330 AC)
	TRACT A AREA:	13,494 S.F. (0.310 AC)
	IMPERVIOUS:	4,048 S.F. (0.093 AC)
	PERVIOUS:	9,446 S.F. (0.217 AC)
	TRACT B AREA:	917 S.F. (0.021 AC)
	IMPERVIOUS:	917 S.F. (0.021 AC)



**FIGURE 14: DEVELOPED AREA MAP**  
**SAMMAMISH 18TH ASSEMBLAGE**  
**24403, 24407, 24515 NE 18TH STREET**  
**SAMMAMISH, WA**

## PERFORMANCE STANDARDS (PART C)

The Project is required to adhere to Level 2 Flow Control criteria. The Level 2 performance criteria requires that the developed condition's durations must match the predeveloped durations ranging from 50% of the two-year peak flow up to the full 50-year peak flow and also match developed peak discharge rates to predeveloped peak discharge rates for the 2-year and 10-year return periods (KCSWDM, Sec. 1.2).

See Appendix A for WWHM output showing compliance.

The Basic Water Quality Treatment goal is to remove 80% of TSS for flows or volumes up to and including the WQ design flow or volume.

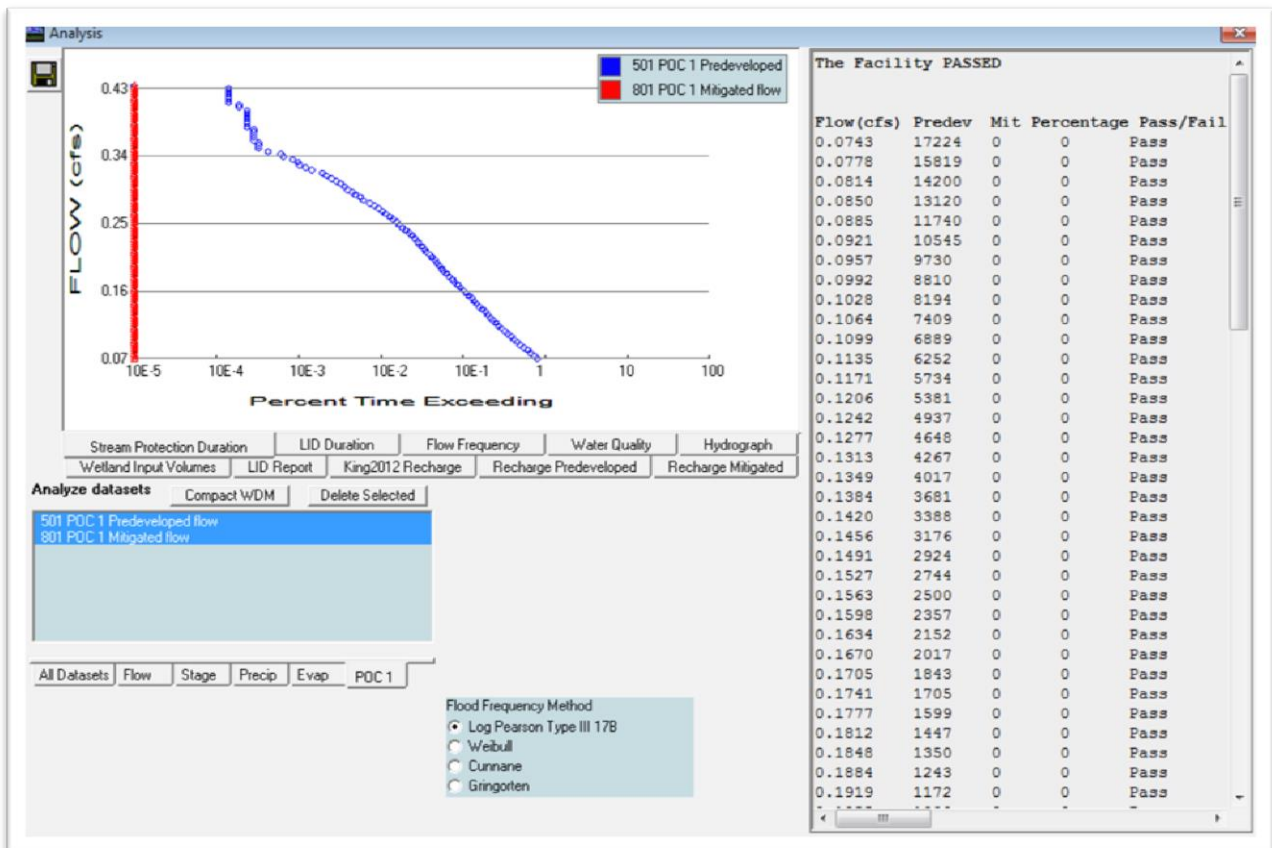
Conveyance criteria for the Project require that all new pipes be designed to convey and contain (at minimum) the 25-year peak flow. The conveyance system design will be analyzed at time of final engineering.

## FLOW CONTROL SYSTEM (PART D)

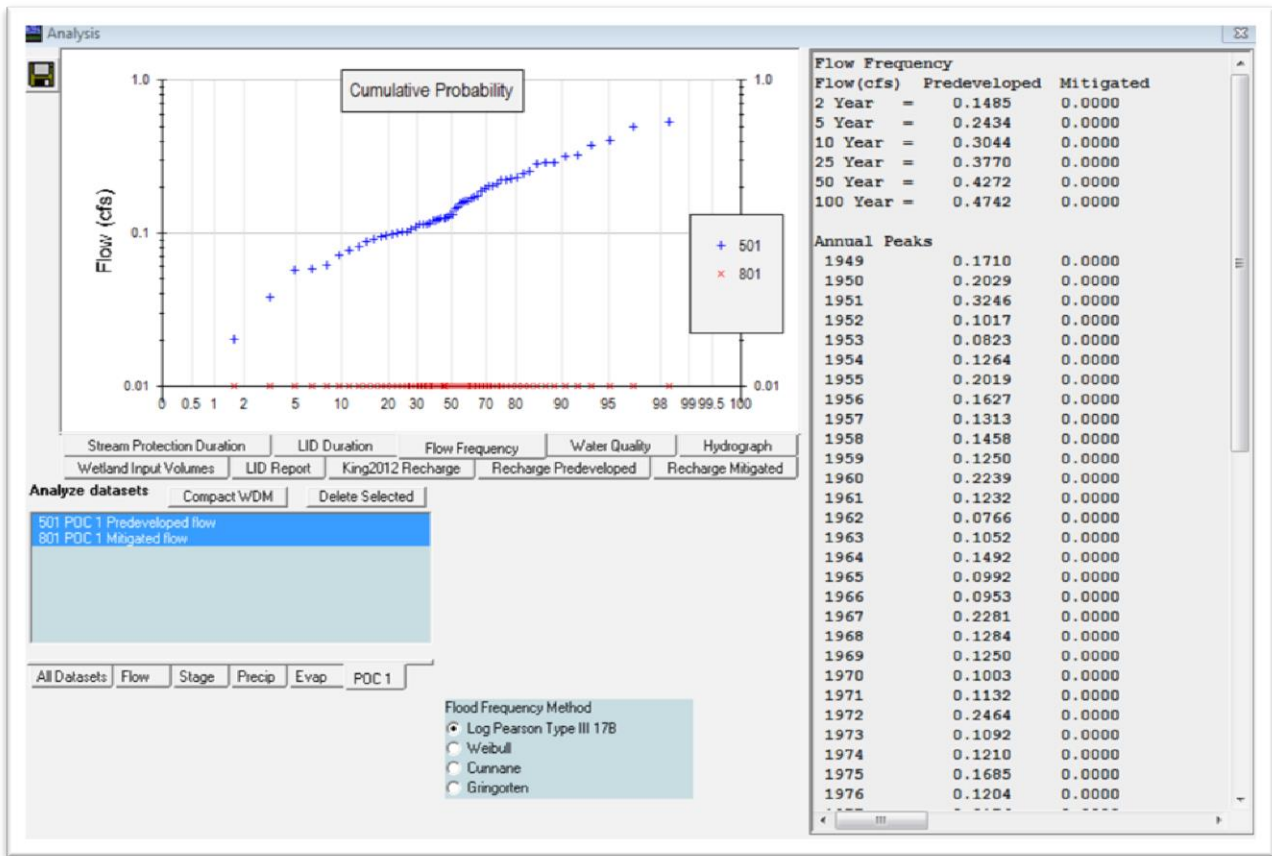
The Site will utilize an infiltration vault meeting the Level 2 Flow Control Criteria. The Western Washington Hydrologic Model (WWHM2012) software was used to size the infiltration facility. The vault design information is included in this section.

## FLOW CONTROL FACILITY DESIGN OUTPUT

See Appendix A for WWHM output.







## WATER QUALITY TREATMENT SYSTEM (PART E)

The Project is located in the Basic Water Quality Treatment area. The treatment goal is 80% removal of total suspend solids for a typical rainfall year, assuming typical pollutant concentrations in urban runoff.

TDA will utilize a StormFilter preceded by a presettling vault to accommodate this requirement. Sizing of the presettling vault is based upon the requirements of the Manual.

## **FIGURE 15 DETENTION & WATER QUALITY FACILITY DETAILS**

This will be provided at time of final engineering.

## **SECTION V**

### **CONVEYANCE SYSTEM ANALYSIS AND DESIGN**

Per C.R. #4 of the KCSWDM, the conveyance system must be analyzed and designed for existing tributary and developed onsite runoff from the proposed project. Pipe systems shall be designed to convey the 100-year design storm. The Rational Method will be used to calculate the Q-Ratio for each pipe node.

Analysis will be performed at final engineering.

## **BACKWATER ANALYSIS**

A backwater analysis will be provided at time of final engineering.

## **SECTION VI**

### **SPECIAL REPORTS AND STUDIES**

The following report and studies have been provided with this submittal.

1. Critical Area Technical Memorandum – Raedeke Associates, Inc. August 7, 2018
2. Traffic Impact Analysis – TENW, September 21, 2018
3. Geotechnical Engineering Study – Associated Earth Sciences, September 24, 2018

## **SECTION VII**

### **OTHER PERMITS, VARIANCES AND ADJUSTMENTS**

None at this time.



## SECTION VIII

### ESC PLAN ANALYSIS AND DESIGN (PART A)

The Erosion and Sedimentation Control Design meets the nine minimum requirements:

1. Clearing Limits – **Areas to remain undisturbed shall be delineated with a high-visibility plastic fence prior to any Site clearing or grading.**
2. Cover Measures – **Disturbed Site areas shall be covered with mulch and seeded, as appropriate, for temporary or permanent measures.**
3. Perimeter protection – **Perimeter protection shall consist of a silt fence down slope of any disturbed areas or stockpiles.**
4. Traffic Area Stabilization – **A stabilized construction entrance will be located at the point of ingress/egress.**
5. Sediment Retention – **Surface water collected from disturbed areas of the Site shall be routed through a sediment vault or sediment traps prior to release from the Site. The sediment vault or traps will be installed prior to grading of any contributing area.**
6. Surface Water Control – **Interceptor berms or swales shall be installed to control and intercept all surface water from disturbed areas. Surface water controls shall be installed concurrently with and/or immediately following rough grading.**
7. Dewatering Control – **Not applicable.**
8. Dust Control – **Dust control shall be provided by spraying exposed soils with water until wet. This is required when exposed soils are dry to the point that wind transport is possible which would impact roadways, drainage ways, surface waters, or neighboring residences.**
9. Flow Control – **Runoff collected in the sediment pond will discharge to the permanent detention vault outfall system.**

## **SWPPS PLAN DESIGN (PART B)**

Construction activities that could contribute pollutants to surface and storm water include the following, with applicable BMP's listed for each item:

1. Storage and use of chemicals: Utilize source control, and soil erosion and sedimentation control practices, such as using only recommended amounts of chemical materials applied in the proper manner; neutralizing concrete wash water, and disposing of excess concrete material only in areas prepared for concrete placement, or return to batch plant; disposing of wash-up waters from water-based paints in sanitary sewer; disposing of wastes from oil-based paints, solvents, thinners, and mineral spirits only through a licensed waste management firm, or treatment, storage, and disposal (TSD) facility.
2. Material delivery and storage: Locate temporary storage areas away from vehicular traffic, near the construction entrance, and away from storm drains. Material Safety Data Sheets (MSDS) should be supplied for all materials stored, and chemicals kept in their original labeled containers. Maintenance, fueling, and repair of heavy equipment and vehicles shall be conducted using spill prevention and control measures. Contaminated surfaces shall be cleaned immediately following any spill incident. Provide cover, containment, and protection from vandalism for all chemicals, liquid products, petroleum products, and other potentially hazardous materials.
3. Building demolition: Protect stormwater drainage system from sediment-laden runoff and loose particles. To the extent possible, use dikes, berms, or other methods to protect overland discharge paths from runoff. Street gutter, sidewalks, driveways, and other paved surfaces in the immediate area of demolition must be swept daily to collect and properly dispose of loose debris and garbage. Spray the minimum amount of water to help control windblown fine particles such as concrete, dust, and paint chips. Avoid excessive spraying so that runoff from the Site does not occur, yet dust control is achieved. Oils must never be used for dust control.
4. Sawcutting: Slurry and cuttings shall be vacuumed during the activity to prevent migration offsite and must not remain on permanent concrete or asphalt paving overnight. Collected slurry and cuttings shall be disposed of in a manner that does not violate ground water or surface water quality standards.

The complete CSWPPP will be submitted at the time of final engineering.

## **SECTION IX**

### **BOND QUANTITIES, FACILITY SUMMARIES, AND DECLARATION OF COVENANT**

1. Bond Quantity Worksheet – will be submitted at final engineering
2. The Stormwater Facility Summary Sheet – will be submitted at final engineering
3. Declaration of Covenant– will be provided prior to final engineering approval.

## **SECTION X**

### **OPERATIONS AND MAINTENANCE MANUAL**

Excerpts from the 2016 KCSWDM will be provided at final engineering.

## **APPENDIX A**

### **WWHM OUTPUT**

**WWHM2012**  
**PROJECT REPORT**



## *General Model Information*

Project Name: Infiltration Vault  
Site Name: Delappe Sheehan  
Site Address:  
City:  
Report Date: 9/24/2018  
Gage: Seatac  
Data Start: 1948/10/01  
Data End: 2009/09/30  
Timestep: 15 Minute  
Precip Scale: 1.000  
Version Date: 2016/11/18  
Version: 4.2.13

## *POC Thresholds*

---

Low Flow Threshold for POC1:	50 Percent of the 2 Year
High Flow Threshold for POC1:	50 Year

---

## *Landuse Basin Data*

### *Predeveloped Land Use*

#### Basin 1

Bypass: No

GroundWater: No

Pervious Land Use      acre  
C, Forest, Mod      4.989

Pervious Total      4.989

Impervious Land Use      acre

Impervious Total      0

Basin Total      4.989

Element Flows To:		
Surface	Interflow	Groundwater

## *Mitigated Land Use*

### Basin 1

Bypass: No

GroundWater: No

Pervious Land Use	acre
C, Lawn, Flat	0.7735
C, Lawn, Mod	0.7735

Pervious Total 1.547

Impervious Land Use	acre
ROADS MOD	1.513
ROOF TOPS FLAT	1.286
DRIVEWAYS FLAT	0.294
SIDEWALKS FLAT	0.35

Impervious Total 3.443

Basin Total 4.99

### Element Flows To:

Surface	Interflow	Groundwater
Vault 1	Vault 1	

## *Routing Elements*

### *Predeveloped Routing*

## Mitigated Routing

### Vault 1

Width: 97.950810898904 ft.  
Length: 73.463108174178 ft.  
Depth: 7 ft.  
Infiltration On  
Infiltration rate: 1.9  
Infiltration safety factor: 1  
Total Volume Infiltrated (ac-ft.): 667.501  
Total Volume Through Riser (ac-ft.): 0  
Total Volume Through Facility (ac-ft.): 667.501  
Percent Infiltrated: 100  
Total Precip Applied to Facility: 0  
Total Evap From Facility: 0  
Discharge Structure  
Riser Height: 6 ft.  
Riser Diameter: 12 in.  
Element Flows To:  
Outlet 1                      Outlet 2

Vault Hydraulic Table

Stage(feet)	Area(ac.)	Volume(ac-ft.)	Discharge(cfs)	Infilt(cfs)
0.0000	0.165	0.000	0.000	0.000
0.0778	0.165	0.012	0.000	0.316
0.1556	0.165	0.025	0.000	0.316
0.2333	0.165	0.038	0.000	0.316
0.3111	0.165	0.051	0.000	0.316
0.3889	0.165	0.064	0.000	0.316
0.4667	0.165	0.077	0.000	0.316
0.5444	0.165	0.089	0.000	0.316
0.6222	0.165	0.102	0.000	0.316
0.7000	0.165	0.115	0.000	0.316
0.7778	0.165	0.128	0.000	0.316
0.8556	0.165	0.141	0.000	0.316
0.9333	0.165	0.154	0.000	0.316
1.0111	0.165	0.167	0.000	0.316
1.0889	0.165	0.179	0.000	0.316
1.1667	0.165	0.192	0.000	0.316
1.2444	0.165	0.205	0.000	0.316
1.3222	0.165	0.218	0.000	0.316
1.4000	0.165	0.231	0.000	0.316
1.4778	0.165	0.244	0.000	0.316
1.5556	0.165	0.257	0.000	0.316
1.6333	0.165	0.269	0.000	0.316
1.7111	0.165	0.282	0.000	0.316
1.7889	0.165	0.295	0.000	0.316
1.8667	0.165	0.308	0.000	0.316
1.9444	0.165	0.321	0.000	0.316
2.0222	0.165	0.334	0.000	0.316
2.1000	0.165	0.346	0.000	0.316
2.1778	0.165	0.359	0.000	0.316
2.2556	0.165	0.372	0.000	0.316
2.3333	0.165	0.385	0.000	0.316
2.4111	0.165	0.398	0.000	0.316

2.4889	0.165	0.411	0.000	0.316
2.5667	0.165	0.424	0.000	0.316
2.6444	0.165	0.436	0.000	0.316
2.7222	0.165	0.449	0.000	0.316
2.8000	0.165	0.462	0.000	0.316
2.8778	0.165	0.475	0.000	0.316
2.9556	0.165	0.488	0.000	0.316
3.0333	0.165	0.501	0.000	0.316
3.1111	0.165	0.513	0.000	0.316
3.1889	0.165	0.526	0.000	0.316
3.2667	0.165	0.539	0.000	0.316
3.3444	0.165	0.552	0.000	0.316
3.4222	0.165	0.565	0.000	0.316
3.5000	0.165	0.578	0.000	0.316
3.5778	0.165	0.591	0.000	0.316
3.6556	0.165	0.603	0.000	0.316
3.7333	0.165	0.616	0.000	0.316
3.8111	0.165	0.629	0.000	0.316
3.8889	0.165	0.642	0.000	0.316
3.9667	0.165	0.655	0.000	0.316
4.0444	0.165	0.668	0.000	0.316
4.1222	0.165	0.681	0.000	0.316
4.2000	0.165	0.693	0.000	0.316
4.2778	0.165	0.706	0.000	0.316
4.3556	0.165	0.719	0.000	0.316
4.4333	0.165	0.732	0.000	0.316
4.5111	0.165	0.745	0.000	0.316
4.5889	0.165	0.758	0.000	0.316
4.6667	0.165	0.770	0.000	0.316
4.7444	0.165	0.783	0.000	0.316
4.8222	0.165	0.796	0.000	0.316
4.9000	0.165	0.809	0.000	0.316
4.9778	0.165	0.822	0.000	0.316
5.0556	0.165	0.835	0.000	0.316
5.1333	0.165	0.848	0.000	0.316
5.2111	0.165	0.860	0.000	0.316
5.2889	0.165	0.873	0.000	0.316
5.3667	0.165	0.886	0.000	0.316
5.4444	0.165	0.899	0.000	0.316
5.5222	0.165	0.912	0.000	0.316
5.6000	0.165	0.925	0.000	0.316
5.6778	0.165	0.937	0.000	0.316
5.7556	0.165	0.950	0.000	0.316
5.8333	0.165	0.963	0.000	0.316
5.9111	0.165	0.976	0.000	0.316
5.9889	0.165	0.989	0.000	0.316
6.0667	0.165	1.002	0.182	0.316
6.1444	0.165	1.015	0.572	0.316
6.2222	0.165	1.027	1.046	0.316
6.3000	0.165	1.040	1.509	0.316
6.3778	0.165	1.053	1.879	0.316
6.4556	0.165	1.066	2.114	0.316
6.5333	0.165	1.079	2.300	0.316
6.6111	0.165	1.092	2.462	0.316
6.6889	0.165	1.105	2.614	0.316
6.7667	0.165	1.117	2.757	0.316
6.8444	0.165	1.130	2.894	0.316
6.9222	0.165	1.143	3.024	0.316



7.0000	0.165	1.156	3.149	0.316
7.0778	0.165	1.169	3.269	0.316
7.1556	0.000	0.000	3.385	0.000

## *Analysis Results*

### *POC 1*

POC #1 was not reported because POC must exist in both scenarios and both scenarios must have been run.

## *Model Default Modifications*

Total of 0 changes have been made.

### *PERLND Changes*

No PERLND changes have been made.

### *IMPLND Changes*

No IMPLND changes have been made.

Appendix  
Predeveloped Schematic



Mitigated Schematic



## Predeveloped UCI File

RUN

GLOBAL

```
WWM4 model simulation
START      1948 10 01      END      2009 09 30
RUN INTERP OUTPUT LEVEL    3      0
RESUME     0 RUN          1
UNIT SYSTEM 1
```

END GLOBAL

FILES

```
<File>  <Un#>  <-----File Name----->***
<-ID->                                     ***
WDM      26      Infiltration Vault.wdm
MESSU    25      PreInfiltration Vault.MES
          27      PreInfiltration Vault.L61
          28      PreInfiltration Vault.L62
          30      POCInfiltration Vault1.dat
```

END FILES

OPN SEQUENCE

INGRP INDELT 00:15

```
PERLND    11
COPY       501
DISPLY     1
```

END INGRP

END OPN SEQUENCE

DISPLY

DISPLY-INFO1

```
# - #<-----Title----->***TRAN PIVL DIG1 FIL1  PYR DIG2 FIL2 YRND
1      Basin 1      MAX      1      2      30      9
```

END DISPLY-INFO1

END DISPLY

COPY

TIMESERIES

```
# - # NPT NMN ***
1      1      1
501    1      1
```

END TIMESERIES

END COPY

GENER

OPCODE

```
#      # OPCD ***
```

END OPCODE

PARM

```
#      #      K ***
```

END PARM

END GENER

PERLND

GEN-INFO

```
<PLS ><-----Name----->NBLKS      Unit-systems      Printer ***
# - #      User      t-series      Engl Metr ***
          in out      ***
11      C, Forest, Mod      1      1      1      1      27      0
```

END GEN-INFO

\*\*\* Section PWATER\*\*\*

ACTIVITY

```
<PLS > ***** Active Sections *****
# - # ATMP SNOW PWAT SED PST PWG PQAL MSTL PEST NITR PHOS TRAC ***
11      0      0      1      0      0      0      0      0      0      0      0      0
```

END ACTIVITY

PRINT-INFO

```
<PLS > ***** Print-flags ***** PIVL PYR
# - # ATMP SNOW PWAT SED PST PWG PQAL MSTL PEST NITR PHOS TRAC *****
11      0      0      4      0      0      0      0      0      0      0      0      0      1      9
```

END PRINT-INFO

```

PWAT-PARM1
<PLS > PWATER variable monthly parameter value flags ***
# - # CSNO RTOP UZFG VCS VUZ VNN VIFW VIRC VLE INFC HWT ***
11      0      0      0      0      0      0      0      0      0      0      0
END PWAT-PARM1

PWAT-PARM2
<PLS > PWATER input info: Part 2 ***
# - # ***FOREST LZSN INFILT LSUR SLSUR KVARV AGWRC
11      0      4.5      0.08      400      0.1      0.5      0.996
END PWAT-PARM2

PWAT-PARM3
<PLS > PWATER input info: Part 3 ***
# - # ***PETMAX PETMIN INFEXP INFILD DEEPFR BASETP AGWETP
11      0      0      2      2      0      0      0
END PWAT-PARM3

PWAT-PARM4
<PLS > PWATER input info: Part 4 ***
# - # CEPSC UZSN NSUR INTFW IRC LZETP ***
11      0.2      0.5      0.35      6      0.5      0.7
END PWAT-PARM4

PWAT-STATE1
<PLS > *** Initial conditions at start of simulation
ran from 1990 to end of 1992 (pat 1-11-95) RUN 21 ***
# - # *** CEPS SURS UZS IFWS LZS AGWS GWVS
11      0      0      0      0      2.5      1      0
END PWAT-STATE1

END PERLND

IMPLND
GEN-INFO
<PLS ><-----Name-----> Unit-systems Printer ***
# - # User t-series Engl Metr ***
in out ***
END GEN-INFO
*** Section IWATER***

ACTIVITY
<PLS > ***** Active Sections *****
# - # ATMP SNOW IWAT SLD IWG IQAL ***
END ACTIVITY

PRINT-INFO
<ILS > ***** Print-flags ***** PIVL PYR
# - # ATMP SNOW IWAT SLD IWG IQAL *****
END PRINT-INFO

IWAT-PARM1
<PLS > IWATER variable monthly parameter value flags ***
# - # CSNO RTOP VRS VNN RTLI ***
END IWAT-PARM1

IWAT-PARM2
<PLS > IWATER input info: Part 2 ***
# - # *** LSUR SLSUR NSUR RETSC
END IWAT-PARM2

IWAT-PARM3
<PLS > IWATER input info: Part 3 ***
# - # ***PETMAX PETMIN
END IWAT-PARM3

IWAT-STATE1
<PLS > *** Initial conditions at start of simulation
# - # *** RETS SURS
END IWAT-STATE1

```

END IMPLND

SCHEMATIC

<-Source->		<--Area-->		<-Target->	MBLK	***
<Name>	#	<-factor->		<Name>	#	Tbl#
Basin	1***					
PERLND	11	4.989		COPY	501	12
PERLND	11	4.989		COPY	501	13

\*\*\*\*\*Routing\*\*\*\*\*

END SCHEMATIC

NETWORK

<-Volume->	<-Grp>	<-Member->	<--Mult-->	Tran	<-Target vols>	<-Grp>	<-Member->	***
<Name>	#	<Name>	#	#	<-factor->strg	<Name>	#	#
COPY	501	OUTPUT	MEAN	1 1	48.4	DISPLY	1	INPUT
								TIMSER 1

<-Volume->	<-Grp>	<-Member->	<--Mult-->	Tran	<-Target vols>	<-Grp>	<-Member->	***
<Name>	#	<Name>	#	#	<-factor->strg	<Name>	#	#

END NETWORK

RCHRES

GEN-INFO

RCHRES	Name	Nexits	Unit	Systems	Printer	***
# - #	<----->	<---->	User	T-series	Engl Metr LKFG	***
			in	out		***

END GEN-INFO

\*\*\* Section RCHRES\*\*\*

ACTIVITY

<PLS > \*\*\*\*\* Active Sections \*\*\*\*\*

#	-	#	HYFG	ADFG	CNFG	HTFG	SDFG	GQFG	OXFG	NUFG	PKFG	PHFG	***
---	---	---	------	------	------	------	------	------	------	------	------	------	-----

END ACTIVITY

PRINT-INFO

<PLS > \*\*\*\*\* Print-flags \*\*\*\*\* PIVL PYR

#	-	#	HYDR	ADCA	CONS	HEAT	SED	GQL	OXRX	NUTR	PLNK	PHCB	PIVL	PYR	*****
---	---	---	------	------	------	------	-----	-----	------	------	------	------	------	-----	-------

END PRINT-INFO

HYDR-PARM1

RCHRES	Flags	for each HYDR Section	***	ODGTFG	for each	FUNCT	for each	***
# - #	VC A1 A2 A3	ODFVFG for each	***	ODGTFG	for each	FUNCT	for each	***
	FG FG FG FG	possible exit	***	possible exit		possible exit		***
	* * * *	* * * *		* * * *		* * * *		

END HYDR-PARM1

HYDR-PARM2

#	-	#	FTABNO	LEN	DELTH	STCOR	KS	DB50	***
<----->	<----->	<----->	<----->	<----->	<----->	<----->	<----->	<----->	***

END HYDR-PARM2

HYDR-INIT

RCHRES	Initial conditions for each HYDR section	***
# - #	*** VOL Initial value of COLIND Initial value of OUTDGT	***
	*** ac-ft for each possible exit for each possible exit	
<----->	<----->	<----->

END HYDR-INIT

END RCHRES

SPEC-ACTIONS

END SPEC-ACTIONS

FTABLES

END FTABLES

EXT SOURCES

<-Volume->	<Member>	SsysSgap	<--Mult-->	Tran	<-Target vols>	<-Grp>	<-Member->	***
<Name>	#	<Name>	#	tem strg	<-factor->strg	<Name>	#	#
WDM	2	PREC	ENGL	1		PERLND	1	999
						EXTNL	PREC	
WDM	2	PREC	ENGL	1		IMPLND	1	999
						EXTNL	PREC	



WDM	1	EVAP	ENGL	0.76	PERLND	1	999	EXTNL	PETINP
WDM	1	EVAP	ENGL	0.76	IMPLND	1	999	EXTNL	PETINP

END EXT SOURCES

EXT TARGETS

<-Volume->	<-Grp>	<-Member->	<--Mult-->	Tran	<-Volume->	<Member>	Tsys	Tgap	Amd	***
<Name>	#	<Name>	#	#<-factor->	strg	<Name>	#	<Name>	tem	strg
COPY	501	OUTPUT	MEAN	1	1	48.4	WDM	501	FLOW	ENGL
REPL										

END EXT TARGETS

MASS-LINK

<Volume>	<-Grp>	<-Member->	<--Mult-->	<Target>	<-Grp>	<-Member->	***
<Name>		<Name>	#	#<-factor->	<Name>		#
MASS-LINK		12					
PERLND	PWATER	SURO		0.083333	COPY	INPUT	MEAN
END MASS-LINK		12					

MASS-LINK		13					
PERLND	PWATER	IFWO		0.083333	COPY	INPUT	MEAN
END MASS-LINK		13					

END MASS-LINK

END RUN

## Mitigated UCI File

RUN

GLOBAL

WWM4 model simulation  
START 1948 10 01 END 2009 09 30  
RUN INTERP OUTPUT LEVEL 3 0  
RESUME 0 RUN 1 UNIT SYSTEM 1  
END GLOBAL

FILES

<File>	<Un#>	<-----File Name----->	***
<-ID->			***
WDM	26	Infiltration Vault.wdm	
MESSU	25	MitInfiltration Vault.MES	
	27	MitInfiltration Vault.L61	
	28	MitInfiltration Vault.L62	
	30	POCInfiltration Vault1.dat	

END FILES

OPN SEQUENCE

INGRP INDELT 00:15

PERLND	16
PERLND	17
IMPLND	2
IMPLND	4
IMPLND	5
IMPLND	8
RCHRES	1
COPY	1
COPY	501
DISPLY	1

END INGRP

END OPN SEQUENCE

DISPLY

DISPLY-INFO1

#	-	#	<-----Title----->	***TRAN	PIVL	DIG1	FIL1	PYR	DIG2	FIL2	YRND
1			Vault 1	MAX				1	2	30	9

END DISPLY-INFO1

END DISPLY

COPY

TIMESERIES

#	-	#	NPT	NMN	***
1			1	1	
501			1	1	

END TIMESERIES

END COPY

GENER

OPCODE

#	#	OPCD	***
---	---	------	-----

END OPCODE

PARM

#	#	K	***
---	---	---	-----

END PARM

END GENER

PERLND

GEN-INFO

<PLS >	<-----Name----->	NBLKS	Unit-systems	Printer	***
#	-	#	User	t-series	Engl Metr
			in	out	***

16	C, Lawn, Flat	1	1	1	1	27	0
17	C, Lawn, Mod	1	1	1	1	27	0

END GEN-INFO

\*\*\* Section PWATER\*\*\*

ACTIVITY

<PLS >	***** Active Sections *****														
#	-	#	ATMP	SNOW	PWAT	SED	PST	PWG	PQAL	MSTL	PEST	NITR	PHOS	TRAC	***
16			0	0	1	0	0	0	0	0	0	0	0	0	

17 0 0 1 0 0 0 0 0 0 0 0 0  
END ACTIVITY

PRINT-INFO

<PLS > \*\*\*\*\* Print-flags \*\*\*\*\* PIVL PYR  
# - # ATMP SNOW PWAT SED PST PWG PQAL MSTL PEST NITR PHOS TRAC \*\*\*\*\*  
16 0 0 4 0 0 0 0 0 0 0 0 0 1 9  
17 0 0 4 0 0 0 0 0 0 0 0 0 1 9  
END PRINT-INFO

PWAT-PARM1

<PLS > PWATER variable monthly parameter value flags \*\*\*  
# - # CSNO RTOP UZFG VCS VUZ VNN VIFW VIRC VLE INFC HWT \*\*\*  
16 0 0 0 0 0 0 0 0 0 0 0  
17 0 0 0 0 0 0 0 0 0 0 0  
END PWAT-PARM1

PWAT-PARM2

<PLS > PWATER input info: Part 2 \*\*\*  
# - # \*\*\*FOREST LZSN INFILT LSUR SLSUR KVARV AGWRC  
16 0 4.5 0.03 400 0.05 0.5 0.996  
17 0 4.5 0.03 400 0.1 0.5 0.996  
END PWAT-PARM2

PWAT-PARM3

<PLS > PWATER input info: Part 3 \*\*\*  
# - # \*\*\*PETMAX PETMIN INFEXP INFILD DEEPFR BASETP AGWETP  
16 0 0 2 2 0 0 0  
17 0 0 2 2 0 0 0  
END PWAT-PARM3

PWAT-PARM4

<PLS > PWATER input info: Part 4 \*\*\*  
# - # CEPSC UZSN NSUR INTFW IRC LZETP \*\*\*  
16 0.1 0.25 0.25 6 0.5 0.25  
17 0.1 0.25 0.25 6 0.5 0.25  
END PWAT-PARM4

PWAT-STATE1

<PLS > \*\*\* Initial conditions at start of simulation  
ran from 1990 to end of 1992 (pat 1-11-95) RUN 21 \*\*\*  
# - # \*\*\* CEPS SURS UZS IFWS LZS AGWS GWVS  
16 0 0 0 0 2.5 1 0  
17 0 0 0 0 2.5 1 0  
END PWAT-STATE1

END PERLND

IMPLND

GEN-INFO

<PLS ><-----Name-----> Unit-systems Printer \*\*\*  
# - # User t-series Engl Metr \*\*\*  
in out \*\*\*  
2 ROADS/MOD 1 1 1 27 0  
4 ROOF TOPS/FLAT 1 1 1 27 0  
5 DRIVEWAYS/FLAT 1 1 1 27 0  
8 SIDEWALKS/FLAT 1 1 1 27 0  
END GEN-INFO  
\*\*\* Section IWATER\*\*\*

ACTIVITY

<PLS > \*\*\*\*\* Active Sections \*\*\*\*\*  
# - # ATMP SNOW IWAT SLD IWG IQAL \*\*\*  
2 0 0 1 0 0 0  
4 0 0 1 0 0 0  
5 0 0 1 0 0 0  
8 0 0 1 0 0 0  
END ACTIVITY

PRINT-INFO

<ILS > \*\*\*\*\* Print-flags \*\*\*\*\* PIVL PYR

#	-	#	ATMP	SNOW	IWAT	SLD	IWG	IQAL	*****
2			0	0	4	0	0	0	1 9
4			0	0	4	0	0	0	1 9
5			0	0	4	0	0	0	1 9
8			0	0	4	0	0	0	1 9

END PRINT-INFO

IWAT-PARM1

<PLS > IWATER variable monthly parameter value flags \*\*\*

#	-	#	CSNO	RTOP	VRS	VNN	RTL	***
2			0	0	0	0	0	
4			0	0	0	0	0	
5			0	0	0	0	0	
8			0	0	0	0	0	

END IWAT-PARM1

IWAT-PARM2

<PLS > IWATER input info: Part 2 \*\*\*

#	-	#	***	LSUR	SLSUR	NSUR	RETSC
2				400	0.05	0.1	0.08
4				400	0.01	0.1	0.1
5				400	0.01	0.1	0.1
8				400	0.01	0.1	0.1

END IWAT-PARM2

IWAT-PARM3

<PLS > IWATER input info: Part 3 \*\*\*

#	-	#	***	PETMAX	PETMIN
2				0	0
4				0	0
5				0	0
8				0	0

END IWAT-PARM3

IWAT-STATE1

<PLS > \*\*\* Initial conditions at start of simulation

#	-	#	***	RETS	SURS
2				0	0
4				0	0
5				0	0
8				0	0

END IWAT-STATE1

END IMPLND

SCHEMATIC

<-Source->	<--Area-->	<-Target->	MBLK	***
<Name> #	<-factor-->	<Name> #	Tbl#	***
Basin 1***				
PERLND 16	0.7735	RCHRES 1	2	
PERLND 16	0.7735	RCHRES 1	3	
PERLND 17	0.7735	RCHRES 1	2	
PERLND 17	0.7735	RCHRES 1	3	
IMPLND 2	1.513	RCHRES 1	5	
IMPLND 4	1.286	RCHRES 1	5	
IMPLND 5	0.294	RCHRES 1	5	
IMPLND 8	0.35	RCHRES 1	5	

\*\*\*\*\*Routing\*\*\*\*\*

PERLND 16	0.7735	COPY 1	12
PERLND 17	0.7735	COPY 1	12
IMPLND 2	1.513	COPY 1	15
IMPLND 4	1.286	COPY 1	15
IMPLND 5	0.294	COPY 1	15
IMPLND 8	0.35	COPY 1	15
PERLND 16	0.7735	COPY 1	13
PERLND 17	0.7735	COPY 1	13
RCHRES 1	1	COPY 501	17

END SCHEMATIC

```

NETWORK
<-Volume-> <-Grp> <-Member-><--Mult-->Tran <-Target vols> <-Grp> <-Member-> ***
<Name> # <Name> # #<-factor->strg <Name> # # <Name> # # ***
COPY 501 OUTPUT MEAN 1 1 48.4 DISPLY 1 INPUT TIMSER 1

<-Volume-> <-Grp> <-Member-><--Mult-->Tran <-Target vols> <-Grp> <-Member-> ***
<Name> # <Name> # #<-factor->strg <Name> # # <Name> # # ***
END NETWORK

RCHRES
GEN-INFO
RCHRES Name Nexits Unit Systems Printer ***
# - #<-----><----> User T-series Engl Metr LKFG ***
in out ***
1 Vault 1 2 1 1 1 28 0 1
END GEN-INFO
*** Section RCHRES***

ACTIVITY
<PLS > ***** Active Sections *****
# - # HYFG ADFG CNFG HTFG SDFG GQFG OXFG NUFG PKFG PHFG ***
1 1 0 0 0 0 0 0 0 0 0
END ACTIVITY

PRINT-INFO
<PLS > ***** Print-flags ***** PIVL PYR
# - # HYDR ADCA CONS HEAT SED GQL OXRX NUTR PLNK PHCB PIVL PYR *****
1 4 0 0 0 0 0 0 0 0 1 9
END PRINT-INFO

HYDR-PARM1
RCHRES Flags for each HYDR Section ***
# - # VC A1 A2 A3 ODFVFG for each *** ODGTFG for each FUNCT for each
FG FG FG FG possible exit *** possible exit possible exit
* * * * * * * * * *
1 0 1 0 0 4 5 0 0 0 0 0 0 0 2 2 2 2 2
END HYDR-PARM1

HYDR-PARM2
# - # FTABNO LEN DELTH STCOR KS DB50 ***
<-----><-----><-----><-----><-----><-----> ***
1 1 0.01 0.0 0.0 0.5 0.0
END HYDR-PARM2

HYDR-INIT
RCHRES Initial conditions for each HYDR section ***
# - # *** VOL Initial value of COLIND Initial value of OUTDGT
*** ac-ft for each possible exit for each possible exit
<-----><-----><-----><-----><-----> *** <-----><-----><-----><-----><----->
1 0 4.0 5.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0
END HYDR-INIT
END RCHRES

SPEC-ACTIONS
END SPEC-ACTIONS

FTABLES
FTABLE 1
92 5
Depth Area Volume Outflow1 Outflow2 Velocity Travel Time***
(ft) (acres) (acre-ft) (cfs) (cfs) (ft/sec) (Minutes)***
0.000000 0.165192 0.000000 0.000000 0.000000
0.077778 0.165192 0.012848 0.000000 0.316481
0.155556 0.165192 0.025697 0.000000 0.316481
0.233333 0.165192 0.038545 0.000000 0.316481
0.311111 0.165192 0.051393 0.000000 0.316481
0.388889 0.165192 0.064241 0.000000 0.316481
0.466667 0.165192 0.077090 0.000000 0.316481
0.544444 0.165192 0.089938 0.000000 0.316481
0.622222 0.165192 0.102786 0.000000 0.316481

```

0.700000	0.165192	0.115635	0.000000	0.316481
0.777778	0.165192	0.128483	0.000000	0.316481
0.855556	0.165192	0.141331	0.000000	0.316481
0.933333	0.165192	0.154179	0.000000	0.316481
1.011111	0.165192	0.167028	0.000000	0.316481
1.088889	0.165192	0.179876	0.000000	0.316481
1.166667	0.165192	0.192724	0.000000	0.316481
1.244444	0.165192	0.205572	0.000000	0.316481
1.322222	0.165192	0.218421	0.000000	0.316481
1.400000	0.165192	0.231269	0.000000	0.316481
1.477778	0.165192	0.244117	0.000000	0.316481
1.555556	0.165192	0.256966	0.000000	0.316481
1.633333	0.165192	0.269814	0.000000	0.316481
1.711111	0.165192	0.282662	0.000000	0.316481
1.788889	0.165192	0.295510	0.000000	0.316481
1.866667	0.165192	0.308359	0.000000	0.316481
1.944444	0.165192	0.321207	0.000000	0.316481
2.022222	0.165192	0.334055	0.000000	0.316481
2.100000	0.165192	0.346904	0.000000	0.316481
2.177778	0.165192	0.359752	0.000000	0.316481
2.255556	0.165192	0.372600	0.000000	0.316481
2.333333	0.165192	0.385448	0.000000	0.316481
2.411111	0.165192	0.398297	0.000000	0.316481
2.488889	0.165192	0.411145	0.000000	0.316481
2.566667	0.165192	0.423993	0.000000	0.316481
2.644444	0.165192	0.436842	0.000000	0.316481
2.722222	0.165192	0.449690	0.000000	0.316481
2.800000	0.165192	0.462538	0.000000	0.316481
2.877778	0.165192	0.475386	0.000000	0.316481
2.955556	0.165192	0.488235	0.000000	0.316481
3.033333	0.165192	0.501083	0.000000	0.316481
3.111111	0.165192	0.513931	0.000000	0.316481
3.188889	0.165192	0.526779	0.000000	0.316481
3.266667	0.165192	0.539628	0.000000	0.316481
3.344444	0.165192	0.552476	0.000000	0.316481
3.422222	0.165192	0.565324	0.000000	0.316481
3.500000	0.165192	0.578173	0.000000	0.316481
3.577778	0.165192	0.591021	0.000000	0.316481
3.655556	0.165192	0.603869	0.000000	0.316481
3.733333	0.165192	0.616717	0.000000	0.316481
3.811111	0.165192	0.629566	0.000000	0.316481
3.888889	0.165192	0.642414	0.000000	0.316481
3.966667	0.165192	0.655262	0.000000	0.316481
4.044444	0.165192	0.668111	0.000000	0.316481
4.122222	0.165192	0.680959	0.000000	0.316481
4.200000	0.165192	0.693807	0.000000	0.316481
4.277778	0.165192	0.706655	0.000000	0.316481
4.355556	0.165192	0.719504	0.000000	0.316481
4.433333	0.165192	0.732352	0.000000	0.316481
4.511111	0.165192	0.745200	0.000000	0.316481
4.588889	0.165192	0.758049	0.000000	0.316481
4.666667	0.165192	0.770897	0.000000	0.316481
4.744444	0.165192	0.783745	0.000000	0.316481
4.822222	0.165192	0.796593	0.000000	0.316481
4.900000	0.165192	0.809442	0.000000	0.316481
4.977778	0.165192	0.822290	0.000000	0.316481
5.055556	0.165192	0.835138	0.000000	0.316481
5.133333	0.165192	0.847986	0.000000	0.316481
5.211111	0.165192	0.860835	0.000000	0.316481
5.288889	0.165192	0.873683	0.000000	0.316481
5.366667	0.165192	0.886531	0.000000	0.316481
5.444444	0.165192	0.899380	0.000000	0.316481
5.522222	0.165192	0.912228	0.000000	0.316481
5.600000	0.165192	0.925076	0.000000	0.316481
5.677778	0.165192	0.937924	0.000000	0.316481
5.755556	0.165192	0.950773	0.000000	0.316481
5.833333	0.165192	0.963621	0.000000	0.316481
5.911111	0.165192	0.976469	0.000000	0.316481
5.988889	0.165192	0.989318	0.000000	0.316481
6.066667	0.165192	1.002166	0.182234	0.316481

6.144444	0.165192	1.015014	0.572643	0.316481
6.222222	0.165192	1.027862	1.046030	0.316481
6.300000	0.165192	1.040711	1.509672	0.316481
6.377778	0.165192	1.053559	1.879270	0.316481
6.455556	0.165192	1.066407	2.114227	0.316481
6.533333	0.165192	1.079256	2.300165	0.316481
6.611111	0.165192	1.092104	2.462179	0.316481
6.688889	0.165192	1.104952	2.614172	0.316481
6.766667	0.165192	1.117800	2.757800	0.316481
6.844444	0.165192	1.130649	2.894310	0.316481
6.922222	0.165192	1.143497	3.024665	0.316481
7.000000	0.165192	1.156345	3.149630	0.316481
7.077778	0.165192	1.169193	3.269822	0.316481

END FTABLE 1  
END FTABLES

#### EXT SOURCES

<-Volume->	<Member>	SsysSgap<--Mult-->	Tran	<-Target	vols>	<-Grp>	<-Member->	***
<Name>	#	<Name>	#	tem strg<-factor->	strg	<Name>	#	<Name> # #
WDM	2	PREC	ENGL	1		PERLND	1 999	EXTNL PREC
WDM	2	PREC	ENGL	1		IMPLND	1 999	EXTNL PREC
WDM	1	EVAP	ENGL	0.76		PERLND	1 999	EXTNL PETINP
WDM	1	EVAP	ENGL	0.76		IMPLND	1 999	EXTNL PETINP

END EXT SOURCES

#### EXT TARGETS

<-Volume->	<-Grp>	<-Member->	<--Mult-->	Tran	<-Volume->	<Member>	Tsys	Tgap	Amd	***
<Name>	#	<Name>	#	#<-factor->	strg	<Name>	#	<Name>	tem strg	strg***
RCHRES	1	HYDR	RO	1 1	1	WDM	1000	FLOW	ENGL	REPL
RCHRES	1	HYDR	O	1 1	1	WDM	1001	FLOW	ENGL	REPL
RCHRES	1	HYDR	O	2 1	1	WDM	1002	FLOW	ENGL	REPL
RCHRES	1	HYDR	STAGE	1 1	1	WDM	1003	STAG	ENGL	REPL
COPY	1	OUTPUT	MEAN	1 1	48.4	WDM	701	FLOW	ENGL	REPL
COPY	501	OUTPUT	MEAN	1 1	48.4	WDM	801	FLOW	ENGL	REPL

END EXT TARGETS

#### MASS-LINK

<Volume>	<-Grp>	<-Member->	<--Mult-->	<Target>	<-Grp>	<-Member->	***
<Name>	#	<Name>	#	#<-factor->	<Name>	#	<Name> # #
MASS-LINK	2						
PERLND	PWATER	SURO		0.083333	RCHRES	INFLOW	IVOL
END MASS-LINK	2						
MASS-LINK	3						
PERLND	PWATER	IFWO		0.083333	RCHRES	INFLOW	IVOL
END MASS-LINK	3						
MASS-LINK	5						
IMPLND	IWATER	SURO		0.083333	RCHRES	INFLOW	IVOL
END MASS-LINK	5						
MASS-LINK	12						
PERLND	PWATER	SURO		0.083333	COPY	INPUT	MEAN
END MASS-LINK	12						
MASS-LINK	13						
PERLND	PWATER	IFWO		0.083333	COPY	INPUT	MEAN
END MASS-LINK	13						
MASS-LINK	15						
IMPLND	IWATER	SURO		0.083333	COPY	INPUT	MEAN
END MASS-LINK	15						
MASS-LINK	17						
RCHRES	OFLOW	OVOL	1		COPY	INPUT	MEAN
END MASS-LINK	17						

END MASS-LINK

END RUN







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